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STAT

SF-U-NA-009-00



## TRW/SAFE BRIEFING



## AGENDA

### MORNING

- WELCOME AND AGENDA ED ROLLIN
- INTRODUCTION TO TRW BOB WILLIAMS
- INTRODUCTION TO TRW'S SAFE PROJECT ED ROLLIN
- PROJECT STATUS ED ROLLIN

### BREAK

- BLOCK 1 REPORT LARRY McLAUGHLIN

### BREAK

- BLOCK 3 REPORT DAYLE McCLENDON

### LUNCH



## AGENDA (CONTINUED)

### AFTERNOON

- SAFE ADPE BOB SPANBAUER
- SAFE COMMUNICATIONS MAURICE FRANCE
- TOUR OF BUILDING 103 ED ROLLIN  
MAURICE FRANCE  
BOB SPANBAUER
- EXECUTIVE SESSION

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## INTRODUCTION TO TRW

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R.D. WILLIAMS  
22 JANUARY 1981

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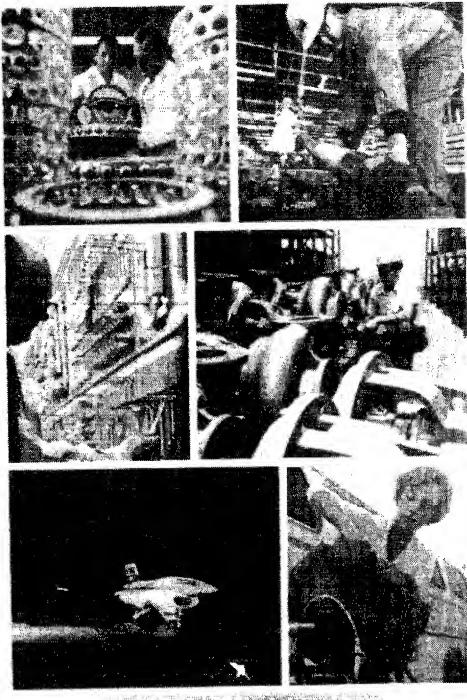
**TRW**

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**CAR AND TRUCK**



**INDUSTRIAL  
AND ENERGY**

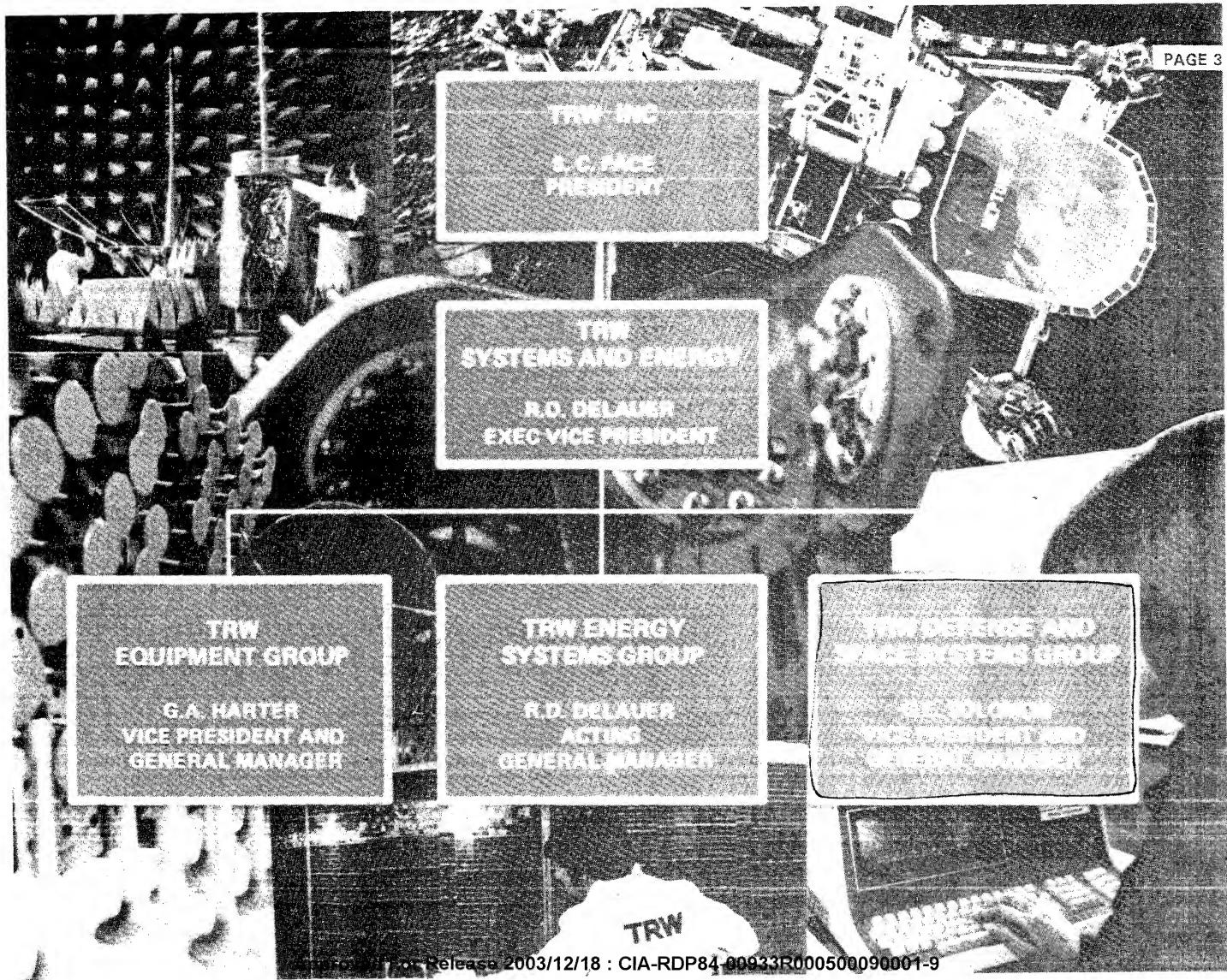


**ELECTRONICS  
AND SPACE SYSTEMS**



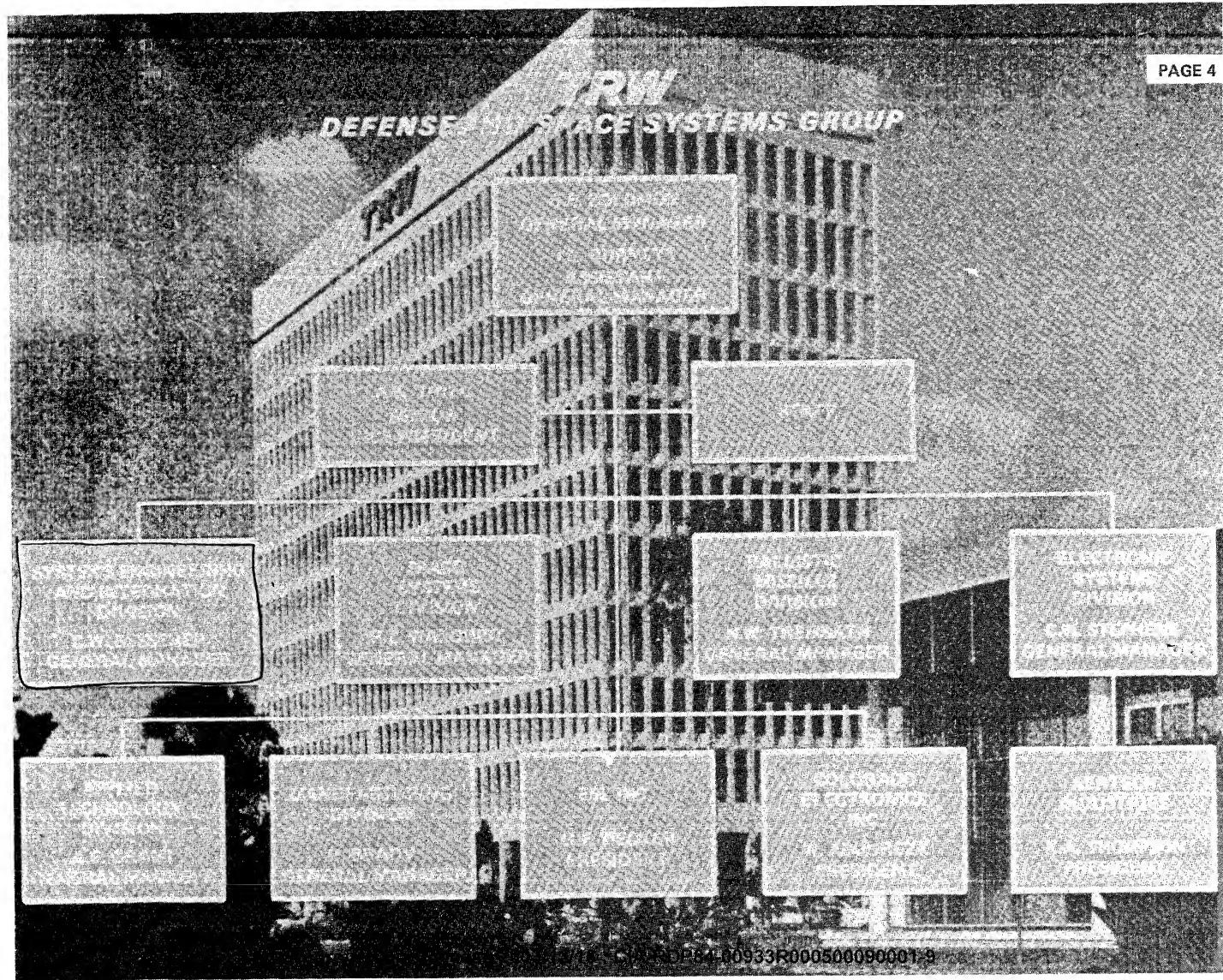
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**TRW**

DEFENSE AND SPACE SYSTEMS GROUP

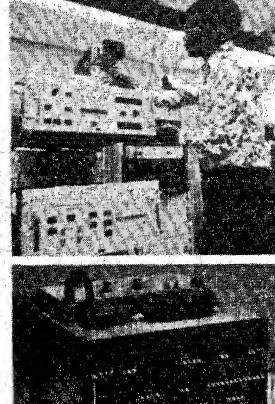
SYSTEMS ENGINEERING  
AND INTEGRATION  
DIVISION



APPLIED  
TECHNOLOGY  
DIVISION



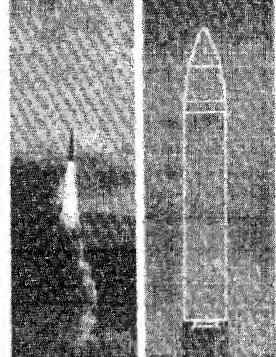
ELECTRONIC  
SYSTEMS  
DIVISION



SPACE  
SYSTEMS  
DIVISION



BALLISTIC  
MISSILES  
DIVISION



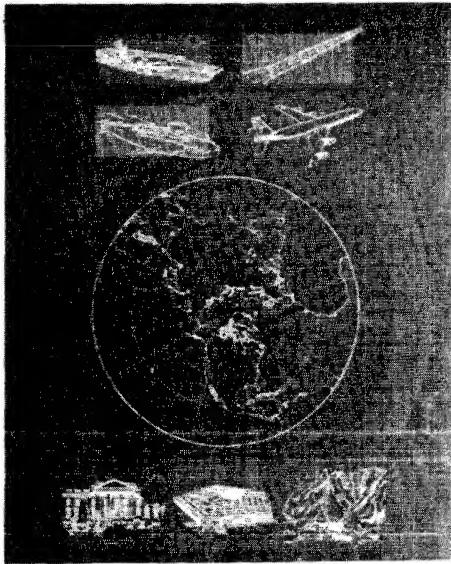
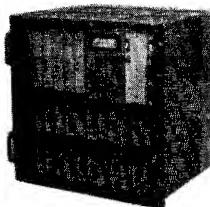
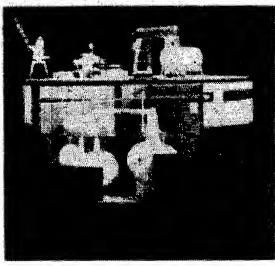
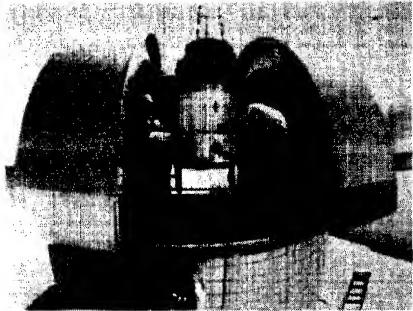
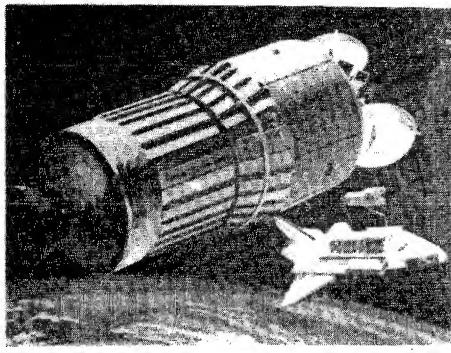
MANUFACTURING  
DIVISION



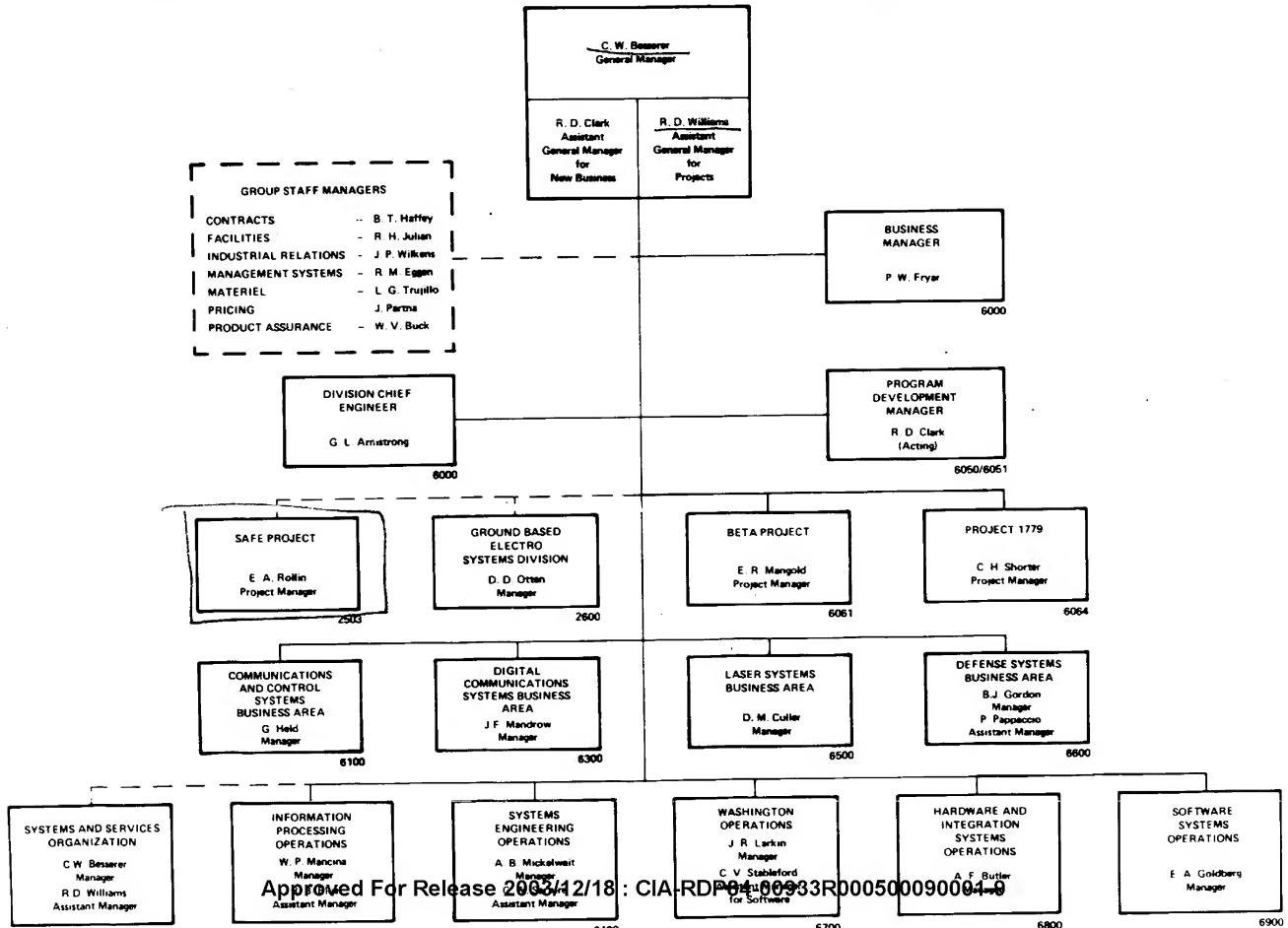
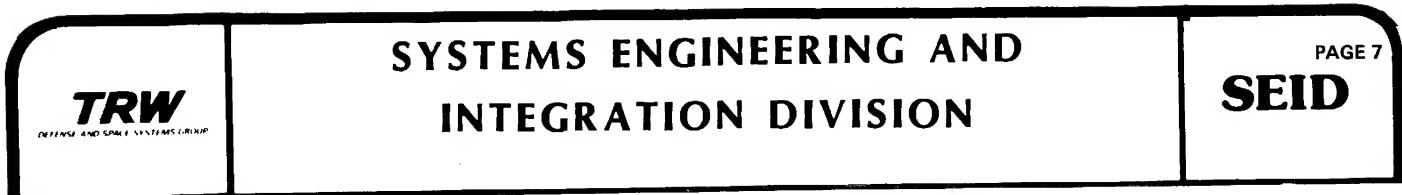
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# SYSTEMS ENGINEERING AND INTEGRATION DIVISION



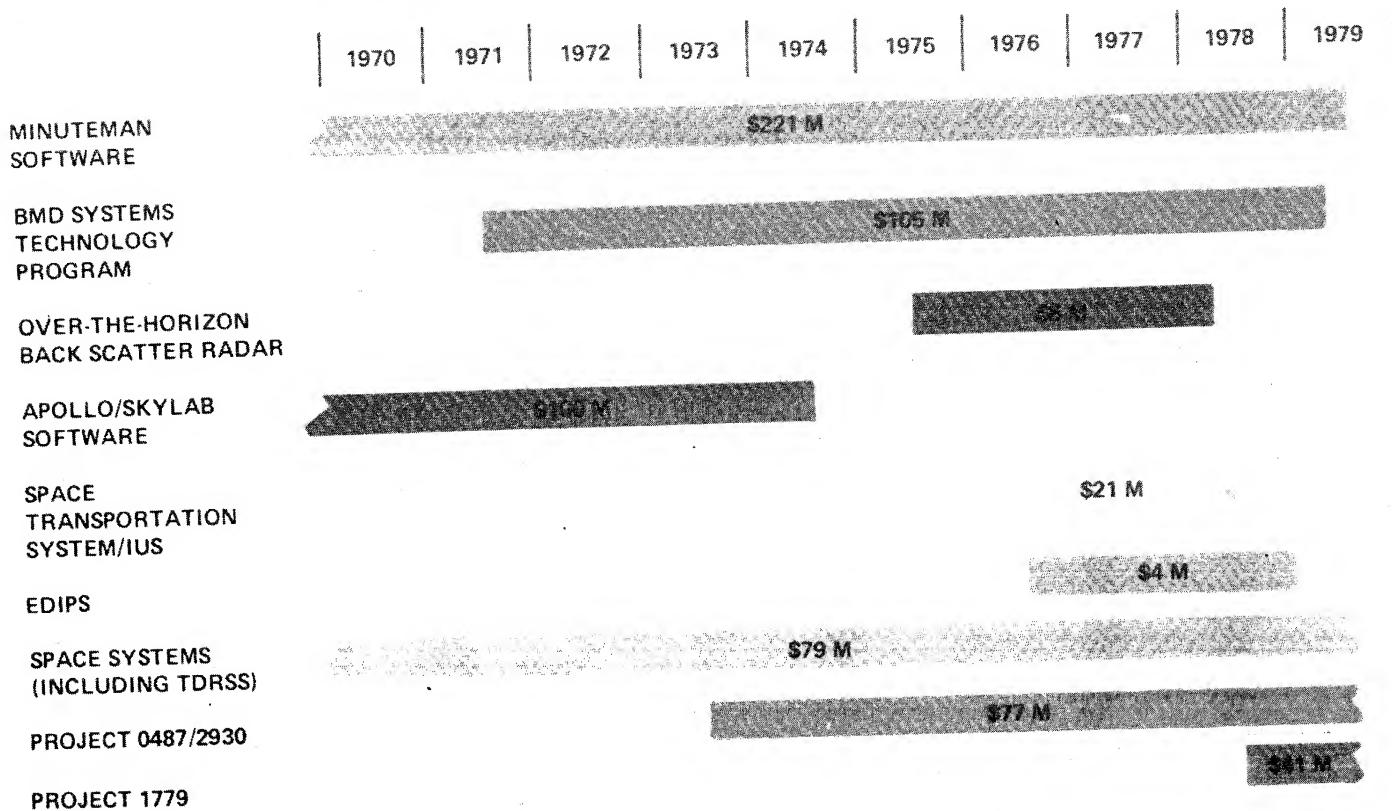
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SEID

## MAJOR SOFTWARE PROJECTS

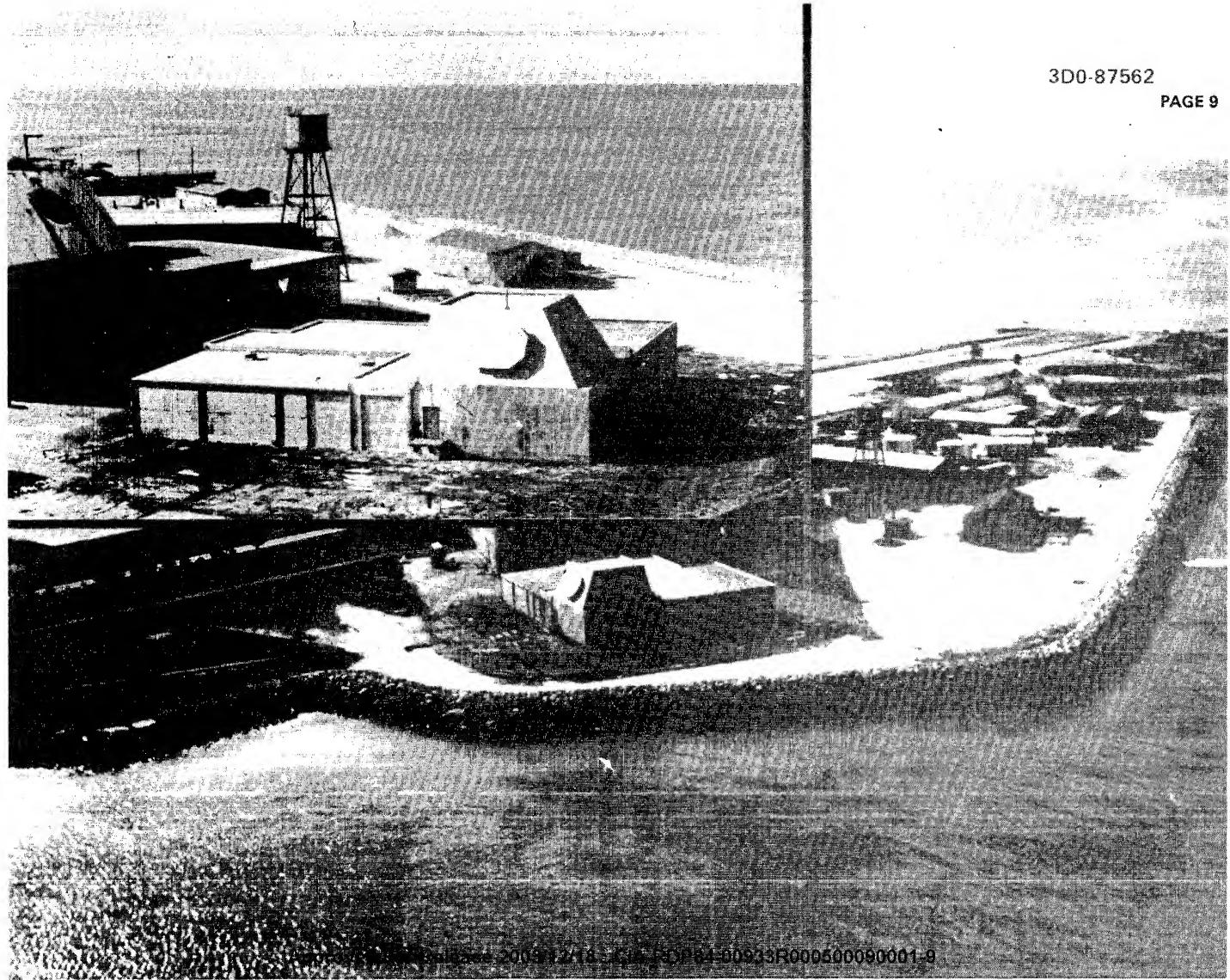
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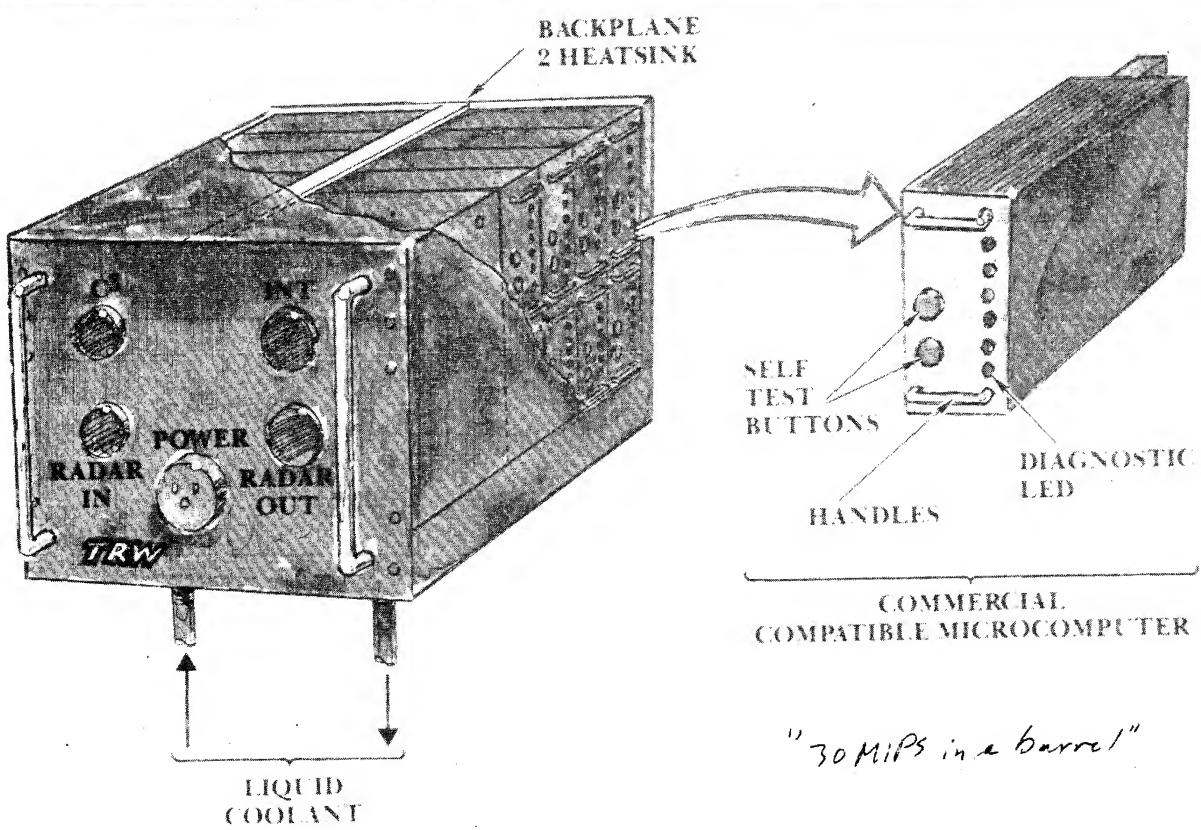


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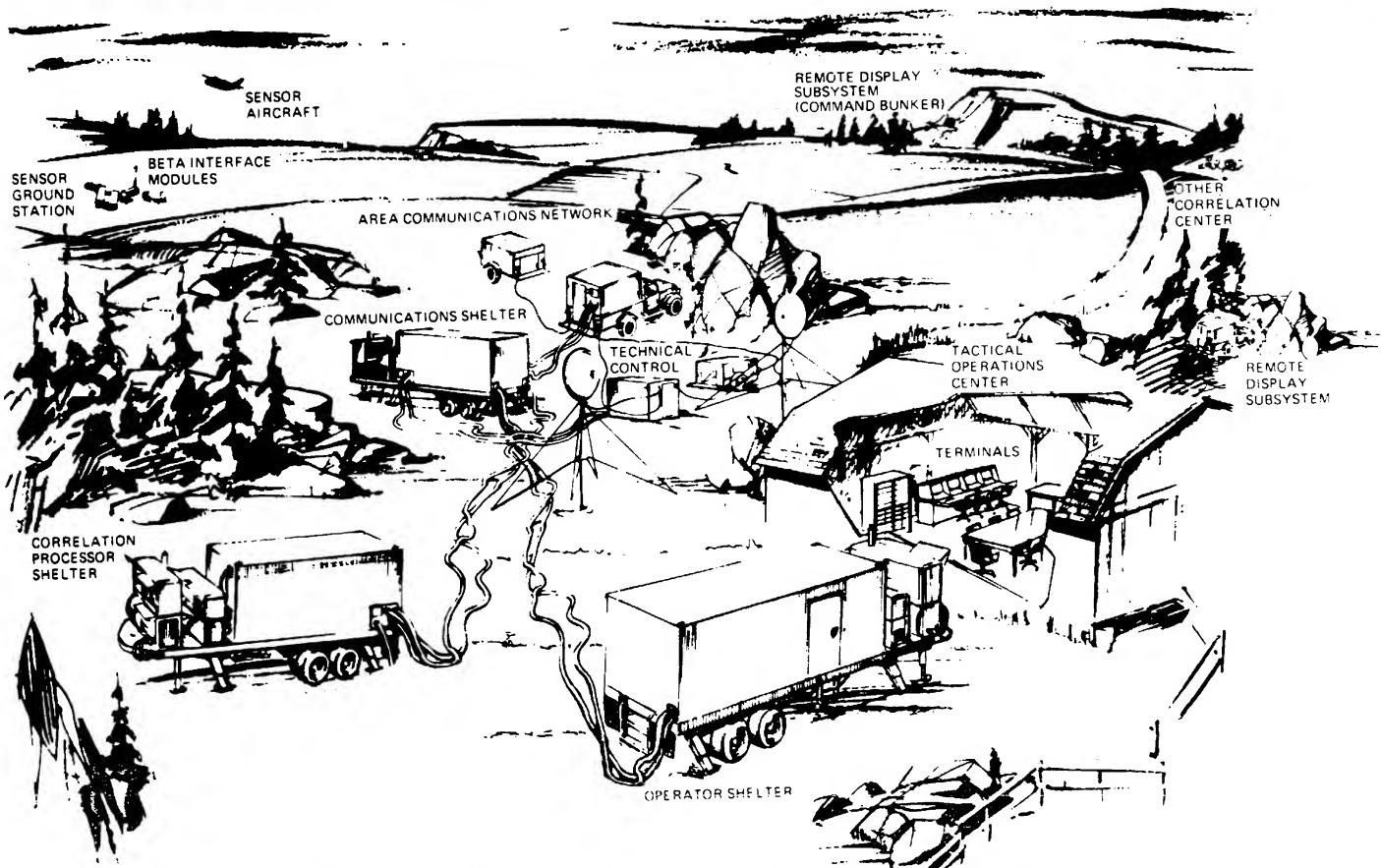
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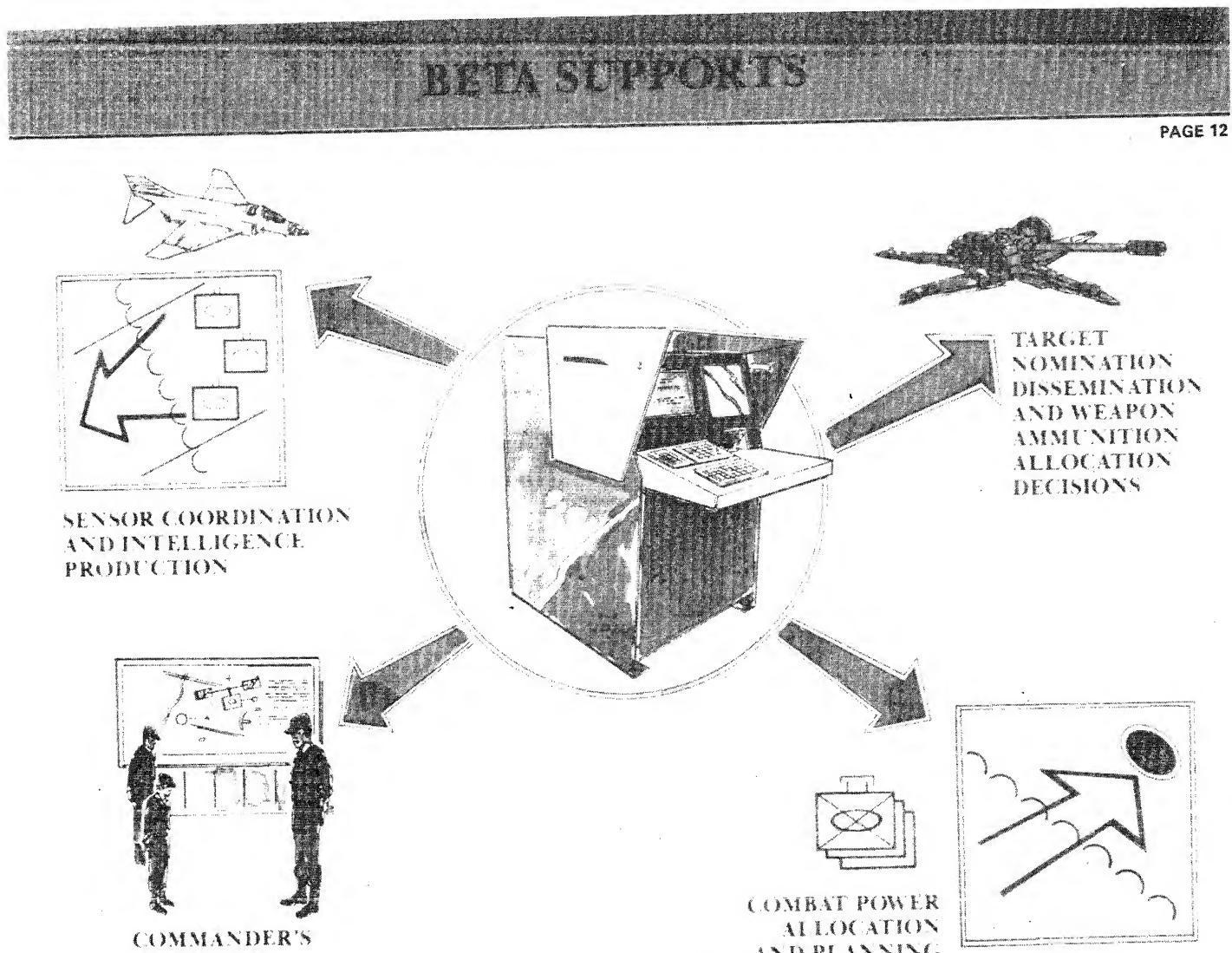
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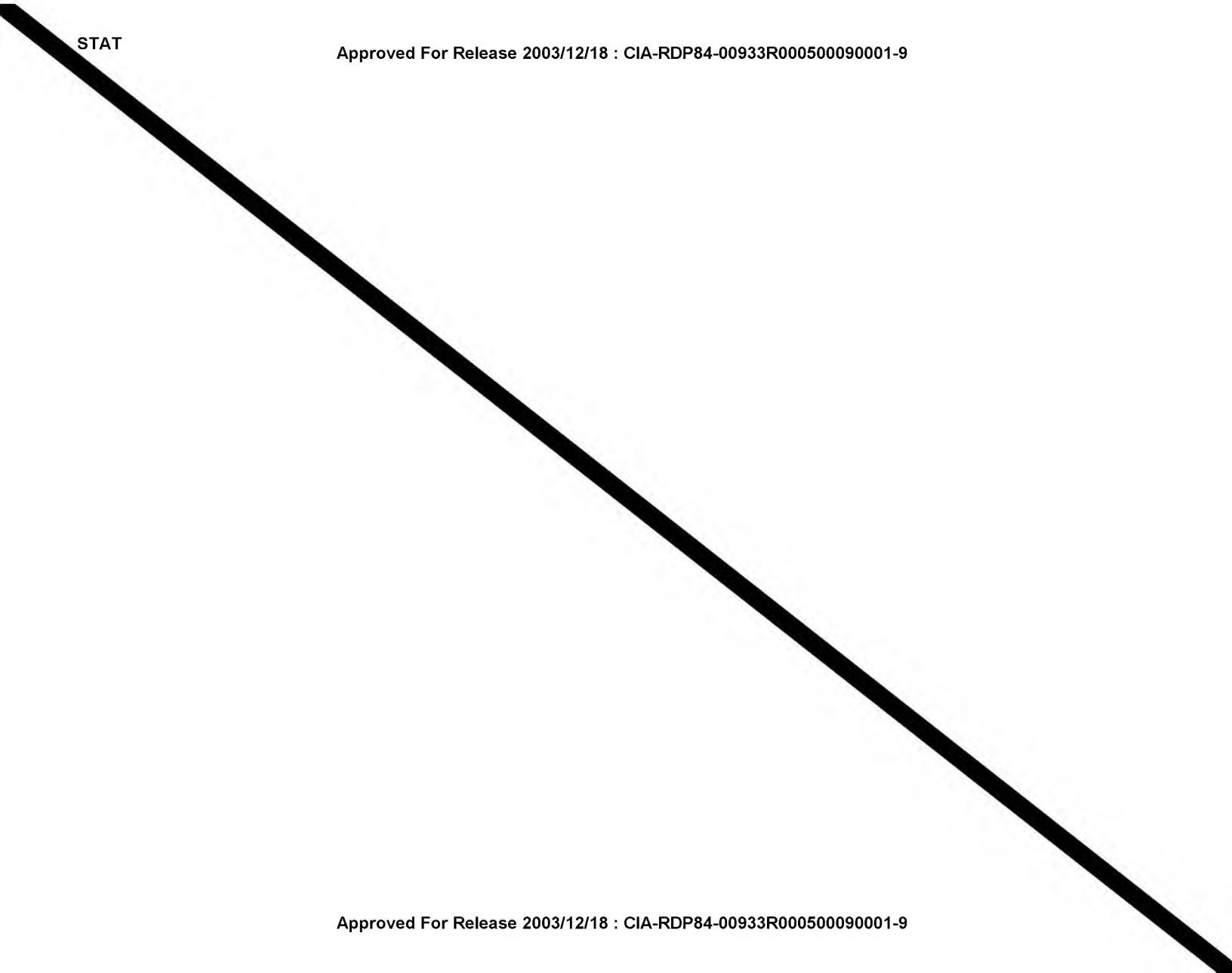


"30 MIPS in a barrel!"





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## TDRSS GROUND STATION COMPLEXITY

### Comparison of Ground Station Capability

ITEM	TYPICAL GROUND STATION	TDRSS GROUND STATION
Active Antenna	1	6 Ground, 26-TDRS
Computers	1	11
Uplinks	1	3-TDRS, 15-Forward
Downlinks	2	3-TDRS, 32-Return
Service Load	5-20 Passes/Day	~2500/Day
Service Time	5-15 Min/Pass	1 Min — 24 Hrs
Normal Response Time	1 Day	30 Min
Emergency Response Time	2 Hrs	5 Min
Reconfiguration Time	2 Hrs	15 Sec — 5 Min
Ephemeris Determination	1/Pass	4-TDRS, 85 User S/C
Electronic Equipment	50 Racks	300 Racks

**TRW**  
DEFENSE AND SPACE SYSTEMS GROUP

## SEID TECHNICAL STAFF PROFILE

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**SEID**

**TOTAL SEID TECHNICAL STAFF** 2285

### SEID EDUCATION AND EXPERIENCE

**TOTAL SEID POPULATION** 3584

**DEGREES** 91%

**ADVANCED DEGREES** 41%

  - **MASTERS** 34%

  - **DOCTORATE** 7%

**AVERAGE YEARS OF  
EXPERIENCE** 15



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## INTRODUCTION TO TRW'S SAFE PROJECT

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E.A. ROLLIN  
22 JANUARY 1981



## INTRODUCTION TO TRW'S SAFE PROJECT

- PROJECT HISTORY AND CURRENT POSTURE
  - ORGANIZATION, FACILITIES, AND SUBCONTRACTS
  - DEVELOPMENT APPROACH
  - AREAS FOR MANAGEMENT EMPHASIS
- THE PROJECT TEAM
- COMMITMENT
- SUMMARY



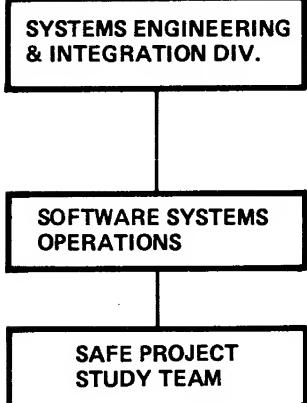
## PROJECT ORGANIZATION

- THE PROJECT BEGAN AS A SMALL STUDY TEAM WITHIN SEID'S SOFTWARE SYSTEMS OPERATION
- FOR THE SYSTEM ACQUISITION PHASE, IT WAS ASSIGNED TO THE S&SO ACCOUNTING SEGMENT
  - REPORTING OPERATIONALLY TO SEID GENERAL MANAGEMENT
- RECENTLY AUGMENTED TO PROVIDE PROPER MANAGEMENT FOCUS FOR BLOCK DEVELOPMENT

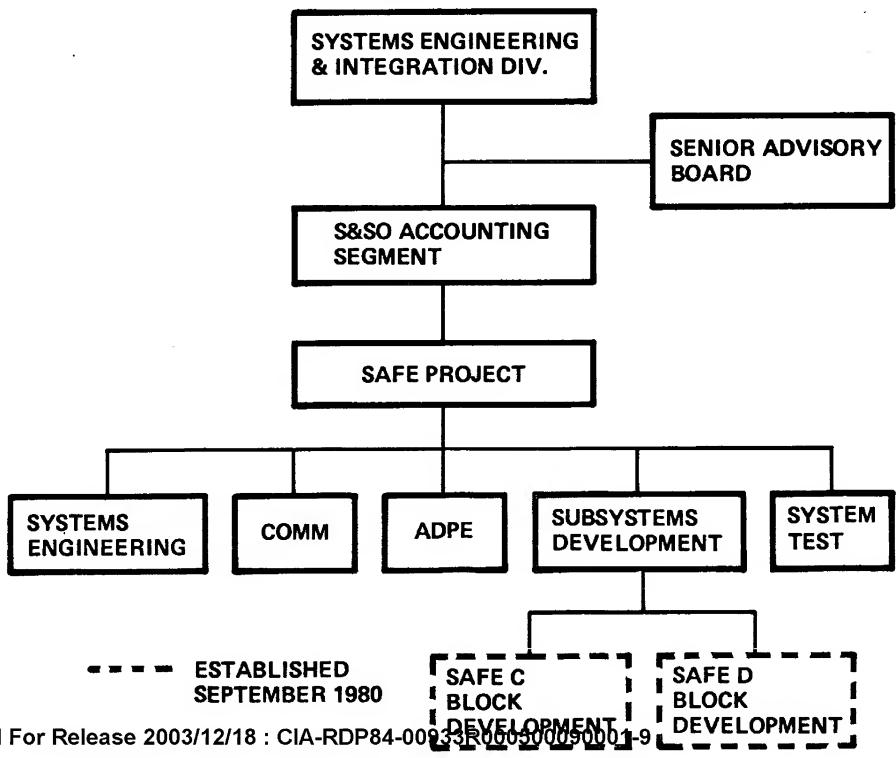


## EVOLUTION OF THE PROJECT ORGANIZATION

DESIGN COMPETITION PHASE  
(JUNE 1978)



SYSTEM ACQUISITION PHASE  
(MAY 1979)





## PROJECT FACILITIES AND SUBCONTRACTS

- **FACILITIES TRANSITIONED FROM SPACE PARK TO INTERIM FACILITIES TO BLDG. 103**
  - REFLECTING THE TRANSITION TO S&SO ACCOUNTING SEGMENT
  - TAILORED TO PROVIDE SPECIAL SECURITY FEATURES AND TECHNOLOGY FOR EFFICIENT DEVELOPMENT
- **ONE INITIAL SUBCONTRACT (TO OSI) FOLLOWED BY TWO OTHER MAJOR SUBCONTRACTS (TO TENAVISION AND TO BURROUGHS)**

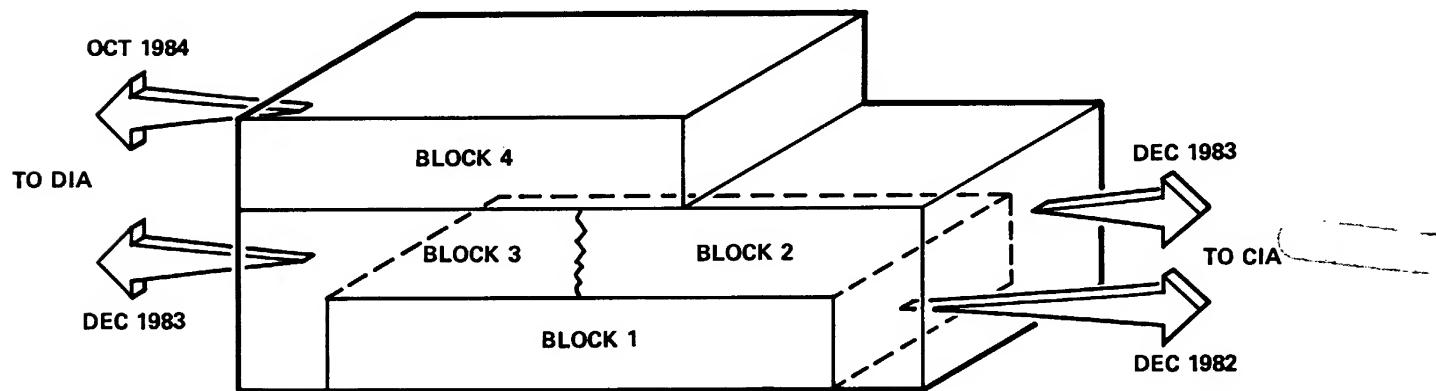


## DEVELOPMENT APPROACH

- METHODOLOGY BASED ON TRW'S LARGE SYSTEM DEVELOPMENT EXPERIENCE
- TAILORED TO INCREMENTAL DEVELOPMENT AND DELIVERY ("BLOCK IMPLEMENTATION")
  - DISTRIBUTES TECHNICAL RISK AND REDUCES SCHEDULE RISK
  - SUPPORTS MORE TIMELY AND DETAILED FEEDBACK INTO THE DESIGN PROCESS
    - DESIGN REVIEWS
    - OPERATIONAL EXPERIENCE (LESSONS LEARNED)
  - PROVIDES AN ORDERLY WAY TO ACCOMMODATE AND SCHEDULE TECHNICAL CHANGES



## BLOCK DEVELOPMENT CONCEPT





## AREAS FOR MANAGEMENT EMPHASIS

- COMPREHENSIVE CSPO/TRW COMMUNICATION
- CONTINUING INVOLVEMENT OF SENIOR MANAGEMENT
- FORCEFUL AND CONTINUOUS TECHNICAL RISK MANAGEMENT
- REGULAR AND EXTENSIVE USER PARTICIPATION THROUGH CSPO



## RISK MANAGEMENT: AREAS FOR EMPHASIS

- DESIGNING AND IMPLEMENTING A BLOCK 3 DMS, AN EARLY VERSION OF WHICH CAN MEET BLOCK 1 REQUIREMENTS – ON SCHEDULE
- GETTING A SET OF "CORE SYSTEM CAPABILITIES" RUNNING VERY EARLY
- DEFINING AND VALIDATING THE SAFE USER INTERFACE
- UNDERSTANDING THE DIAOLS FILE ENVIRONMENT AND DATA USAGE BEFORE DESIGNING THE BLOCK 3 DATA BASE AND DMS



## THE PROJECT TEAM

- TRW'S SAFE PROJECT HAS ATTRACTED TOP TALENT
- THE PROJECT LEADERSHIP HAS A SOLID BACKGROUND IN DEVELOPMENT OF LARGE CUSTOM SYSTEMS
  - THEY SHARE MANY "LESSONS LEARNED"
  - AVERAGE 17 YEARS EXPERIENCE
- THE TEAM DEMONSTRATES HIGH MOTIVATION AND PERSONAL COMMITMENT TO SAFE



## TRW COMMITMENT TO SAFE

- PERSONAL COMMITMENT OF THE PROJECT TEAM
- CORPORATE COMMITMENT EXPRESSED THROUGH:
  - ASSIGNMENT OF TOP TALENT TO THIS PROGRAM
  - SUBSTANTIAL CAPITAL INVESTMENT (\$2.5M) FOR THE SAFE FACILITY
  - SUBSTANTIAL IR&D INVESTMENT FOR TECHNOLOGY AND PRODUCTS TO SUPPORT EFFICIENT DEVELOPMENT
  - SUBSTANTIAL INVESTMENT OF SENIOR MANAGEMENT TIME
- TRW'S COMMITMENT TO SAFE CONTINUES THROUGH SUCCESSFUL OPERATIONAL EMPLOYMENT



## SUMMARY OF MAJOR TRW THEMES

- GET TOP PEOPLE TO JOIN THE PROJECT TEAM
- KEEP SENIOR MANAGEMENT INFORMED AND INVOLVED
- MAINTAIN PERSONAL AND CORPORATE COMMITMENT TO SAFE –  
CONTINUING THROUGH SUCCESSFUL OPERATIONAL EMPLOYMENT
- STRESS DEPTH AND CONTINUITY OF TRW/CSPO COMMUNICATION
- INVOLVE THE USER IN THE DESIGN PROCESS
- FORCEFULLY CONDUCT THE ON-GOING RISK MANAGEMENT  
ACTIVITY
- ~~DISTRIBUTE TECHNICAL/RISK INFORMATION~~ REDUCE SCHEDULED RISK

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## PROJECT STATUS

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E.A. ROLLIN  
22 JANUARY 1981



## PROJECT STATUS

EVENT/ ACTIVITY PHASE	CY 1979	CY 1980	CY 1981	CY 1982	CY 1983	CY 1984	CY 1985
	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985
CONTRACT AWARD	5/79						
REQUIREMENTS ANALYSIS		1/80	2/81				
SYSTEM DESIGN		SRR 7/80	CRR 3/81	PDR			
COMMUNICATIONS DESIGN		SDR 3/81	8/81	COMM CDR			
BLOCK 1 IMPLEMENTATION (CIA)		PDR 3/82	DEVELOPMENT	SYSTEM TEST	12/82 BLOCK 1 DELIVERY 6/83		
BLOCK 2 IMPLEMENTATION (CIA)				DEVELOPMENT	12/83 BLOCK 2 DELIVERY		
BLOCK 3 IMPLEMENTATION (DIA)			DEVELOPMENT	SYSTEM TEST	12/83 BLOCK 3 DELIVERY		
BLOCK 4 IMPLEMENTATION (DIA)				DEVELOPMENT	3/84	10/84 BLOCK 4 DELIVERY	
CONTRACT COMPLETION				SYSTEM TEST		11/84	

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## BLOCK 1 REPORT

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*L.L. McLAUGHLIN*  
22 JANUARY 1981



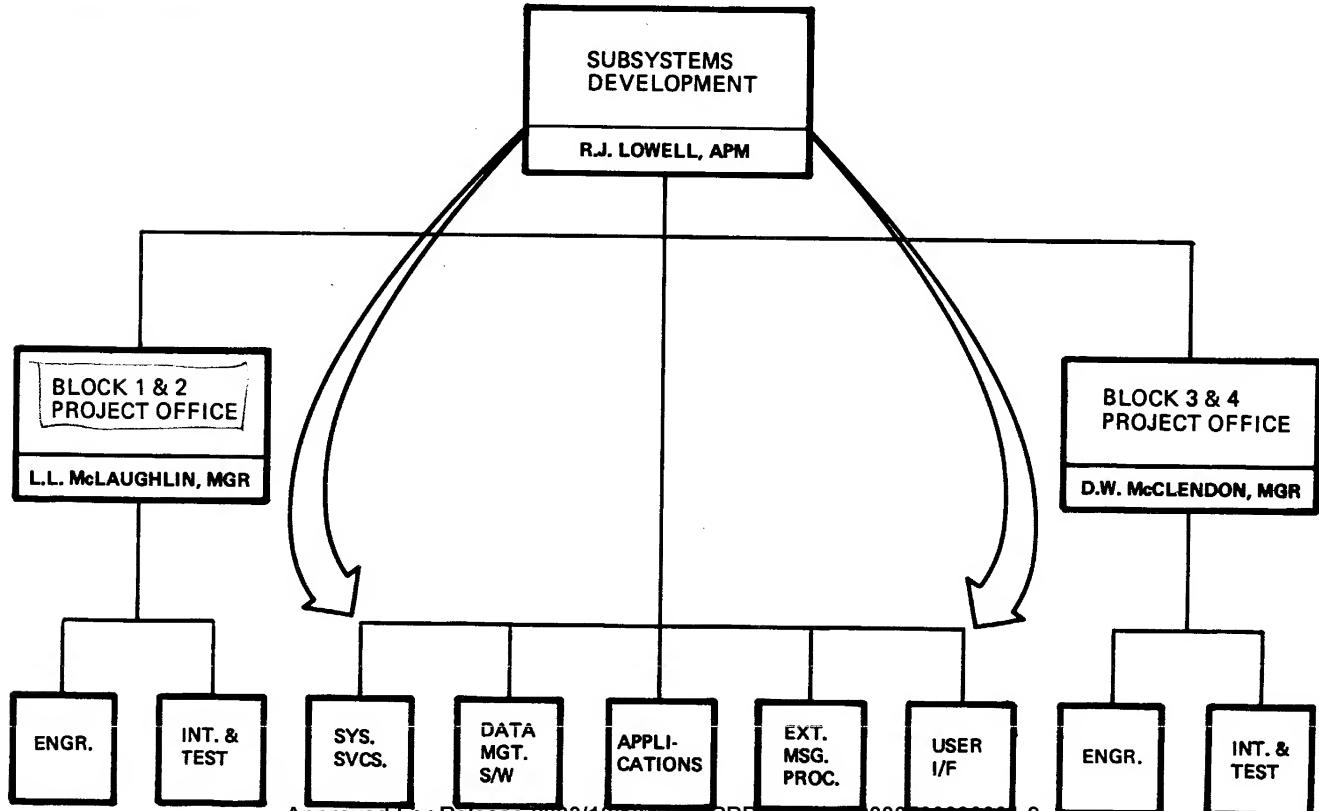
**BLOCK 1 PROJECT OFFICE IS RESPONSIBLE  
FOR THE TOTAL BLOCK 1 SAFE SYSTEM**

**ORGANIZATIONAL ENTITIES**

- **BLOCK ENGINEERING**
- **SOFTWARE DEVELOPMENT TEAMS**
  - APPLICATIONS
  - DATA MANAGEMENT
  - SYSTEM SERVICES
  - ELECTRICAL MESSAGE PROCESSING
  - USER INTERFACE



## SUBSYSTEMS DEVELOPMENT ORGANIZATION





**BLOCK 1 IS THE FOUNDATION FOR BOTH  
THE CIA AND DIA SAFE SYSTEMS**

- ✓ **95% OF BLOCK 1 SOFTWARE IS COMMON TO BLOCK 3**
  - **BASIC SET OF SYSTEM SERVICES**
  - **BASIC SET OF DATA MANAGEMENT SERVICES**
  - **STRUCTURE AND CONTROL SOFTWARE**
  - **NETWORK AND TERMINAL COMMUNICATIONS SOFTWARE**
- **ADPE AND HARDWARE ARCHITECTURE COMMON FOR ALL BLOCKS**

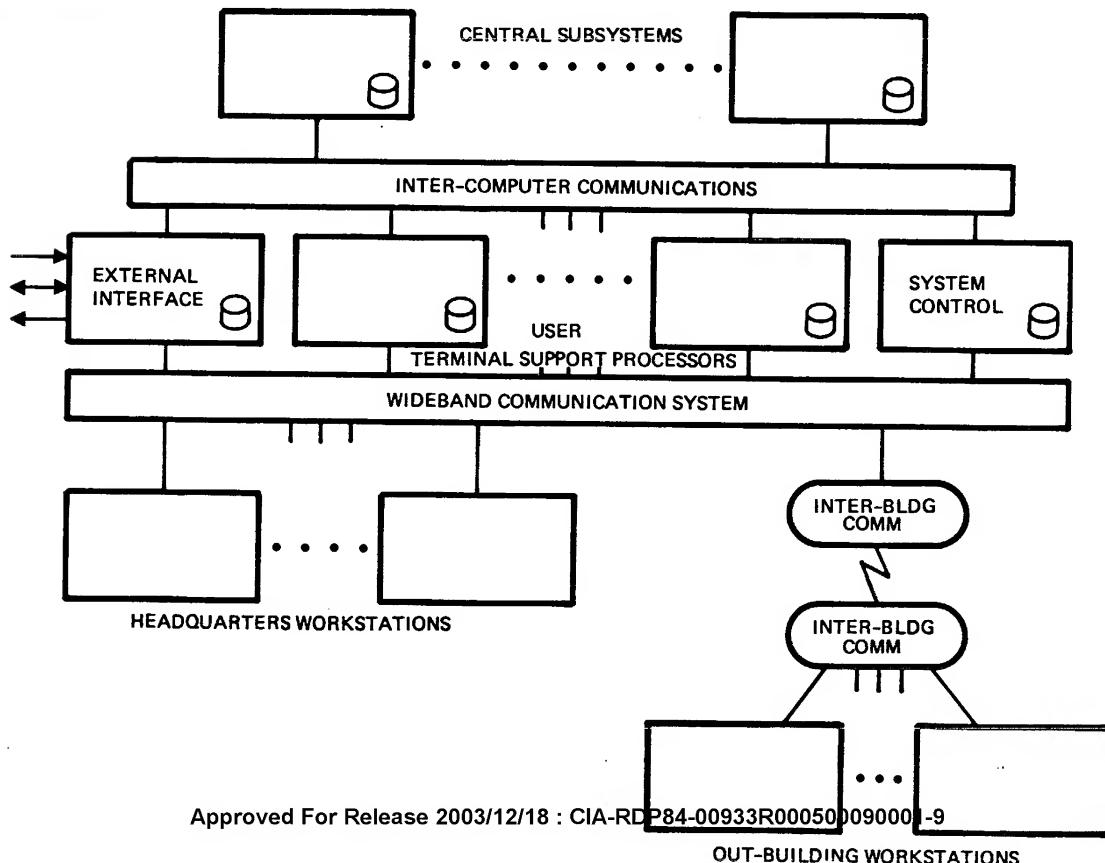


THE DESIGN ALSO MAXIMIZES INTRA-SUBSYSTEM  
SOFTWARE COMMONALITY

- ALL SUBSYSTEM DESIGNS ARE LAYERED BASED ON SYSTEM DESIGN GUIDELINES
  - APPLICATIONS
  - SYSTEM SERVICES
  - DATA MANAGEMENT SERVICES
- LAYERED DESIGN MAXIMIZES THE UTILIZATION OF COMMON SOFTWARE BETWEEN SUBSYSTEMS
- COMMON DESIGN IS MAJOR FACTOR IN ADDRESSING SYSTEM COST AND RISK



## THE SAFE ARCHITECTURE



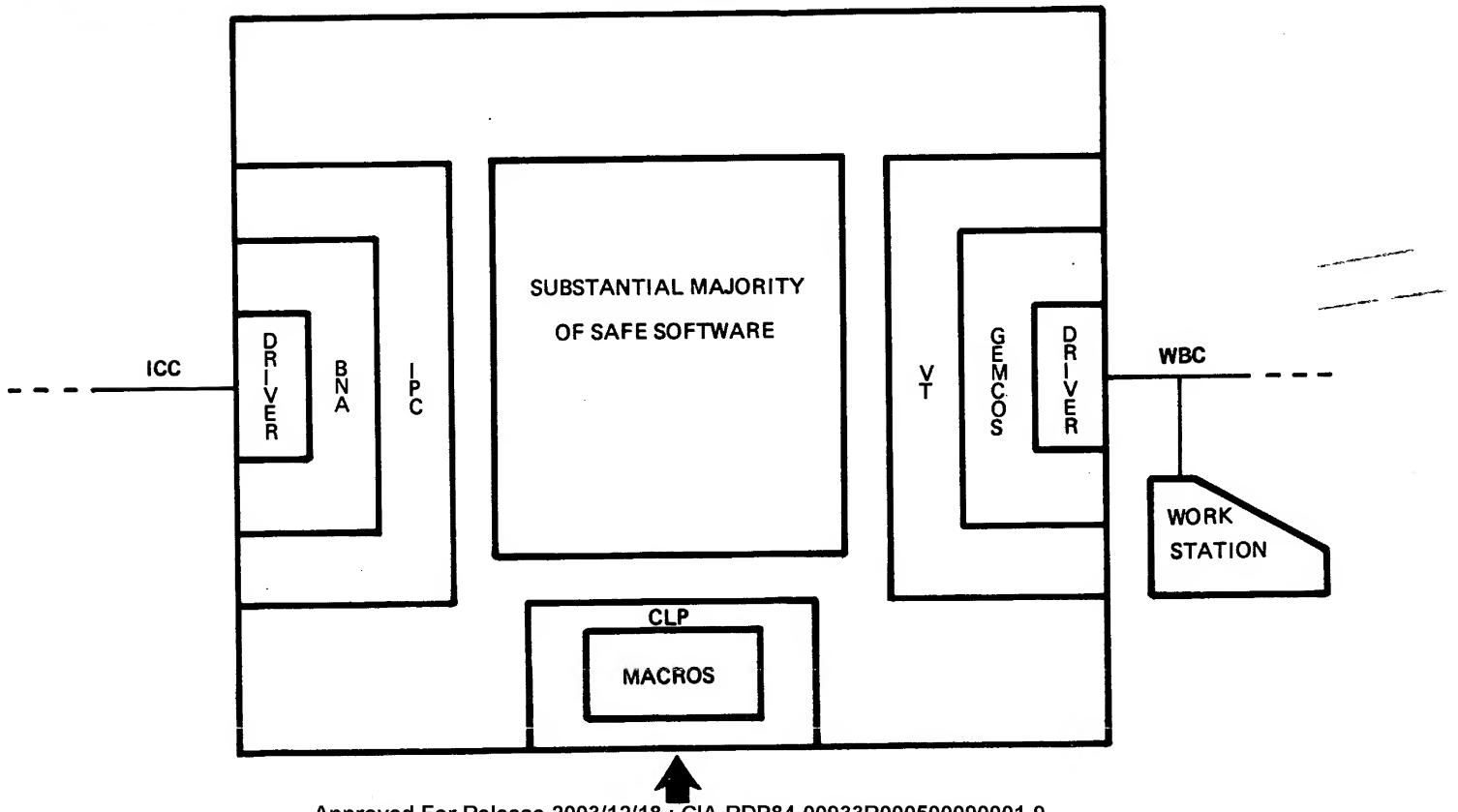
## SOFTWARE COMMONALITY MATRIX

SOFTWARE PROGRAMS	SUBSYSTEMS				
	SCM	UTS	GL1	GL2	EMP
<u>System Services</u>					
● IPC	X	X	X	X	X
● Process Support	X	X	X	X	X
● Terminal Comm.	X	X	X	X	X
● File Access	X	X	X	X	X
● Miscellaneous	X	X	X	X	X
<u>Applications Programs</u>					
● Keyboard Process	X	X	N/A	N/A	N/A
● Display Processes	X	X	N/A	N/A	X
● File Server Process	X	X	X	X	X
● Mail Dissemination Process	N/A	X	X	N/A	X
● Creator	X	N/A	N/A	N/A	N/A
● Configuration Manager	X	X	X	X	X
● Health Monitor	X	X	X	X	X
● On-Line System Test	X	X	X	X	X
● Distribution Directory Maint.	X	X	X	X	X
● System Initialization	X	N/A	N/A	N/A	N/A
● System Termination	X	N/A	N/A	N/A	N/A
● System Switch	X	N/A	N/A	N/A	N/A
● Security Processor	X	X	X	X	X
● MIS Logger	X	X	X	X	X
● MIS Report Generator	X	X	X	X	X
● Print Control	X	X	X	X	X
● External I/Fs	-	-	-	-	X
● Message Analysis	-	-	-	-	X
● Document Dissemination	-	-	-	-	X
● Sequencing Control	-	-	-	-	X
<u>DMS Programs</u>					
● VT DMS	X	X	N/A	N/A	N/A
● Maintenance Function	X	X	X	X	N/A
● Record Retrieval Function	X	X	X	X	N/A
● Search Function	X	X	X	X	N/A
● Support Function	X	X	X	X	N/A



## THE DESIGN IS MODULARIZED TO ISOLATE THE EFFECT OF INTERFACE CHANGES

### SUBSYSTEMS





BLOCK 1 CONTAINS THE KEY CAPABILITIES WHICH  
AUTOMATE THE USERS FILE ENVIRONMENT FOR CIA

- CURRENT AWARENESS BY AUTOMATIC DISSEMINATION
- INTERPROFILE LOGIC USING GLOBAL PROFILES
- AFB FOR CENTRAL INDEX FILES
- CATALOG FILE MAINTENANCE
- CENTRAL INDEX FILE
- PRIVATE FILES
- TEXT SEARCH BY STREAMING
- INDEX SEARCH
- COMPOSE AND EDIT
- SYSTEM-CONTROLLED INPUT/OUTPUT FORMATTING
- BATCH REPORTING OF MIS DATA
- DIRECT CONNECTION TO ODP

WITH

- USER POPULATION OF 450 FULL FUNCTION USERS SHARING 230 TERMINALS



## BLOCK 2 INTRODUCES SUBSTANTIALLY GREATER OPERATIONAL CAPABILITIES

- ALL OF BLOCK 1 PLUS:
  - INTERPROFILE LOGIC USING INTERMEDIATE AND GLOBAL PROFILES
  - AFB FOR BRANCH/PRIVATE INDEX FILES
  - INVERTED DOCUMENT TEXT SEARCH CAPABILITY ✓
  - CONTROLLED ACCESS
  - USER-SPECIFIED THRESHOLDS
  - USER CONTROLLED INPUT/OUTPUT FORMATTING
  - ODP LINK AND BATCH TO ODP ✓

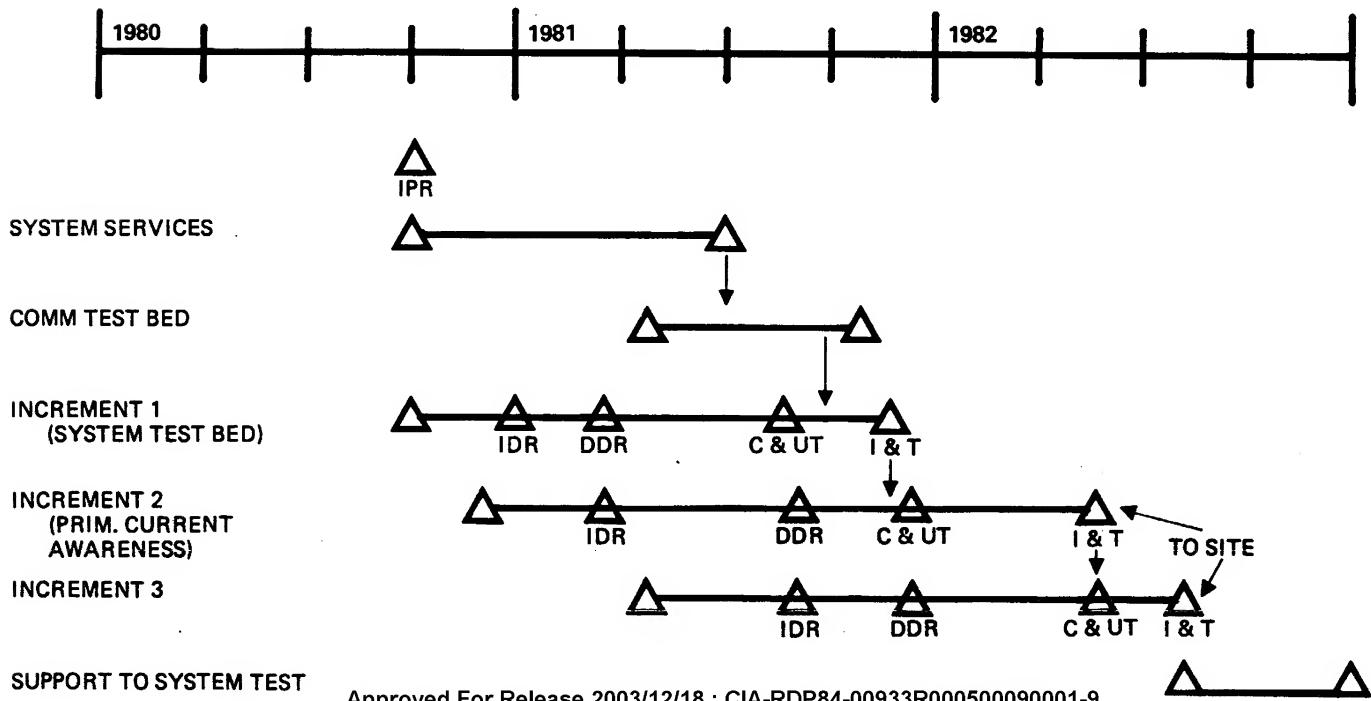


**INCREMENTAL DEVELOPMENT SCHEDULES  
RISK REDUCING ACTIVITIES EARLY**

- ACCOMPLISH EARLY SYSTEM SERVICES DESIGN AND INTEGRATION
- PROVIDE EARLY COMMUNICATIONS INTEGRATION AND NETWORKING CAPABILITY
- SUPPORTS VERY EARLY EXTERNAL INTERFACE AND LIVE DATA TESTING AT LANGLEY
- YIELDS A DEMONSTRATABLE SAFE IN EARLY SUMMER 1982
  - TO MAKE SAFE REAL



## DEVELOPMENT SCHEDULE FOR BLOCK 1





## INCREMENTAL DEVELOPMENT PROVIDES MORE EFFECTIVE USE OF PEOPLE AND RESOURCES

- **DEVELOPMENT GEARED TO INTEGRATION**
  - SMOOTH TRANSITION TO INTEGRATION AND TEST
  - EFFICIENT INTEGRATION
    - (FEWER TEST DRIVERS; NO SOFTWARE ON THE SHELF)
    - (OBJECTIVE IS HIGH PRODUCTIVITY)
- **FREQUENTLY SPACED REVIEWS**
  - IMPORTANT TO GOVERNMENT
  - GIVES TRW BETTER VISIBILITY AND CONTROL
- **A BALANCED SKILL MIX IS ACHIEVED OVER THE DEVELOPMENT PERIOD**



**DEVELOPMENT FACILITY PROVIDES ACCESSIBLE  
DEVELOPMENT SUPPORT AND  
A FLEXIBLE TEST ENVIRONMENT**

- **SAFE TERMINALS IN PROGRAMMERS' OFFICES**
  - LOG-ON FOR DIRECT CONNECT TO MACHINES FOR DEVELOPMENT
  - LOG-ON VIA WBC FOR DEVELOPMENT TEST
- **RECONFIGURABLE NETWORK**
  - STAND-ALONE MAXI FOR DEVELOPMENT
  - ALL-MIDI NETWORK FOR EARLY SOFTWARE INTEGRATION
  - ALLOWS ANY MACHINE TO BE ANY SUBSYSTEM



THE BLOCK 1 SOFTWARE MAXIMIZES THE USE  
OF APPLICABLE COMMERCIAL SOFTWARE



- OPERATING SYSTEM - MCP
- FILE ACCESS - DMS II
- NETWORK COMMUNICATIONS - BNA
- TERMINAL COMMUNICATIONS - GEMCOS



EMPHASIS IS CURRENTLY BEING PLACED IN  
SEVERAL AREAS TO MANAGE RISK

- CONTROLLING GROWTH OF SOFTWARE SIZE AND COMPLEXITY
- INTER-COMPUTER COMMUNICATIONS (ICC) SCHEDULE AND PERFORMANCE
- WIDEBAND COMMUNICATIONS (WBC) SCHEDULE AND INTEGRATION
- TIMELY DEFINITION AND COORDINATION OF THE USER INTERFACE



## FOUR TECHNIQUES ARE USED TO CONTROL THE GROWTH OF SOFTWARE SIZE AND COMPLEXITY

- COMMONALITY OF DESIGN HELPS MINIMIZE SOFTWARE TO BE DEVELOPED
- USE OF EXISTING COMMERCIAL SOFTWARE REDUCES NEED FOR NEW DEVELOPMENT
- LAYERING PROMOTES STANDARD INTERFACES BETWEEN SUBSYSTEMS AND REDUCES INTEGRATION EFFORT
- INCREMENTAL DEVELOPMENT SCHEDULES MINIMIZE BREAKAGE AND PRECLUDE LARGE, COMPLEX INTEGRATION AND TEST DRIVERS



**INTERIM, PRIMARY, AND FALL BACK SOLUTIONS  
HAVE BEEN IDENTIFIED FOR THE ICC**

- DATA COMM UNDER BNA PROVIDES AN INTERIM CAPABILITY FOR THE SYSTEM TEST BED (INCR 1)
- NSC (HYPERchannel) UNDER BNA BEING DEVELOPED BY BURROUGHS AS A BLOCK 1 AND FOC SOLUTION
- A FALLBACK BLOCK 1 SOLUTION IS THE BURROUGHS HUB



**THE BLOCK 1 PLAN MAKES USE OF INTERIM  
AND PROTOTYPE WBC SOLUTIONS**

- DATA COMM UNDER BNA PROVIDES AN INTERIM CAPABILITY FOR CONNECTING WORKSTATIONS TO THE NETWORK
- PROTOTYPES OF THE WBC TECHNOLOGY WILL BE EXERCISED IN THIS BUILDING
  - CABLE
  - BIU
  - PIU
- WBC DEVELOPMENT BEING INTEGRATED WITH THE BLOCK 1 PROJECT OFFICE TO COORDINATE DESIGN AND DIRECT INTEGRATION AND TEST



## DEFINITION AND VALIDATION OF THE USER INTERFACE

- JOINT CIA, DIA AND TRW WORKING GROUP
  - OPERATIONAL CONCEPTS
  - USER SCENARIOS
- INTENSIVE COORDINATION OF USER LANGUAGE SPECIFICATION
- DESIGNER/ANALYST INTERACTION AT NFAC
  - EXPANDS AWARENESS ON BOTH SIDES
  - IMPORTANT FOR EFFECTIVE DESIGN
- PAPER MODELS AND WORKSTATION MOCK-UPS
- CLOSE INTEGRATION OF USER LANGUAGE EFFORT AND USER INTERFACE IMPLEMENTATION



## DEFINITION AND VALIDATION OF THE USER INTERFACE

- JOINT CIA, DIA AND TRW WORKING GROUP
  - OPERATIONAL CONCEPTS
  - USER SCENARIOS
- INTENSIVE COORDINATION OF USER LANGUAGE SPECIFICATION
- DESIGNER/ANALYST INTERACTION AT NFAC
  - EXPANDS AWARENESS ON BOTH SIDES
  - IMPORTANT FOR EFFECTIVE DESIGN
- PAPER MODELS AND WORKSTATION MOCK-UPS
- CLOSE INTEGRATION OF USER LANGUAGE EFFORT AND USER INTERFACE IMPLEMENTATION



## SUMMARY OF KEY THEMES

- MAKE BLOCK 1 DESIGN AN EFFECTIVE FOUNDATION FOR BOTH SAFE C AND D
- DEVELOP A BLOCK 1 SYSTEM WHICH PROVIDES A VIABLE OPERATIONAL CAPABILITY
- AGGRESSIVELY MANAGE TECHNICAL, COST AND SCHEDULE RISKS
- FOLLOW BLOCK 1 THROUGH A SUCCESSFUL TRANSITION TO THE USER

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## **BLOCK 3 REPORT**

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*D.W. McCLENDON*  
**22 JANUARY 1981**

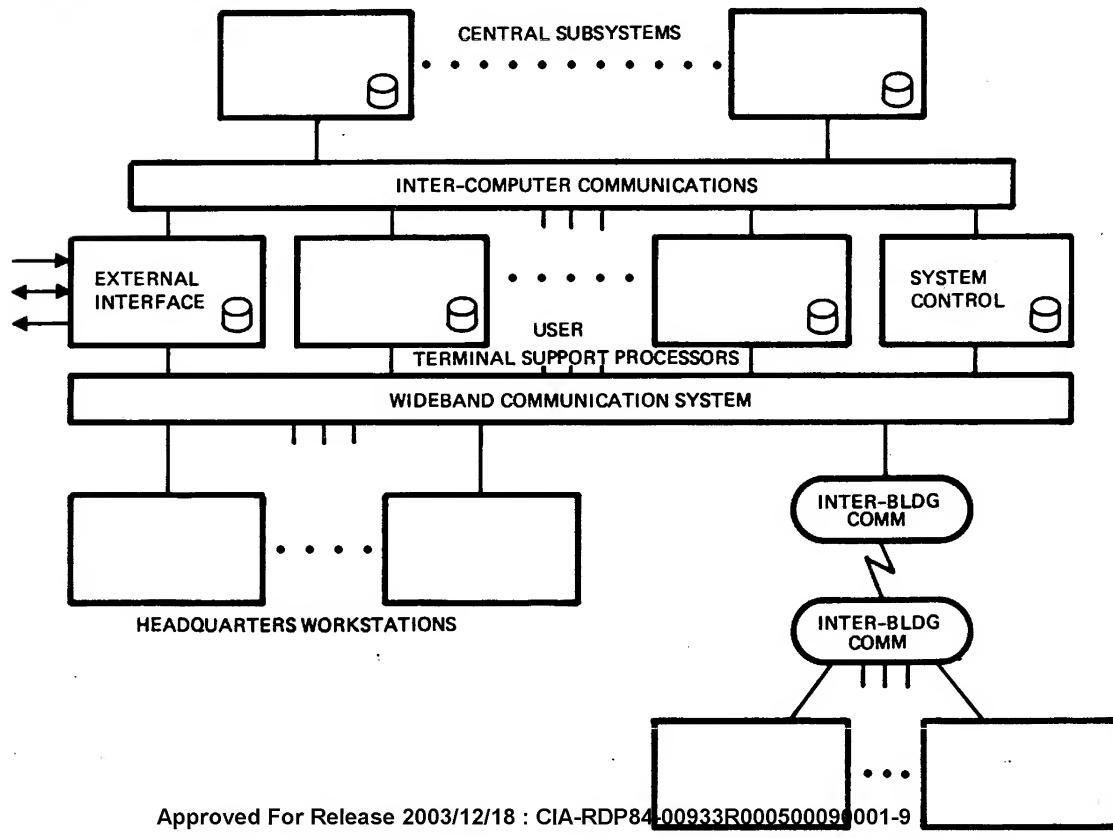


## SAFE D AGENDA TOPICS

- BLOCK 3 & 4 CONTENTS
- BLOCK 3 ORGANIZATION
- BLOCK 3 & 4 DEVELOPMENT APPROACH
- KEY AREAS FOR MANAGEMENT EMPHASIS



## THE SAFE ARCHITECTURE





## CONTENTS OF BLOCK 3 (DIA)

- **BLOCK 1 PLUS:**
  - DATA BASE MANAGEMENT FOR LARGE STRUCTURED/INTER-RELATED FILES
  - REPORT PRODUCTION
  - DISSEMINATION OF INTERNALLY-COMPOSED DOCUMENTS
  - TELECONFERENCING USING ROUTE CAPABILITIES
  - LOW RESOLUTION GRAPHICS
  - DIA/DIAOLS OPERATIONS CONVERSION
  - ON-LINE PROGRAMMING
  - BATCH SUPPORT
- **USER POPULATION OF 500 FULL FUNCTION USERS SHARING 230 TERMINALS**

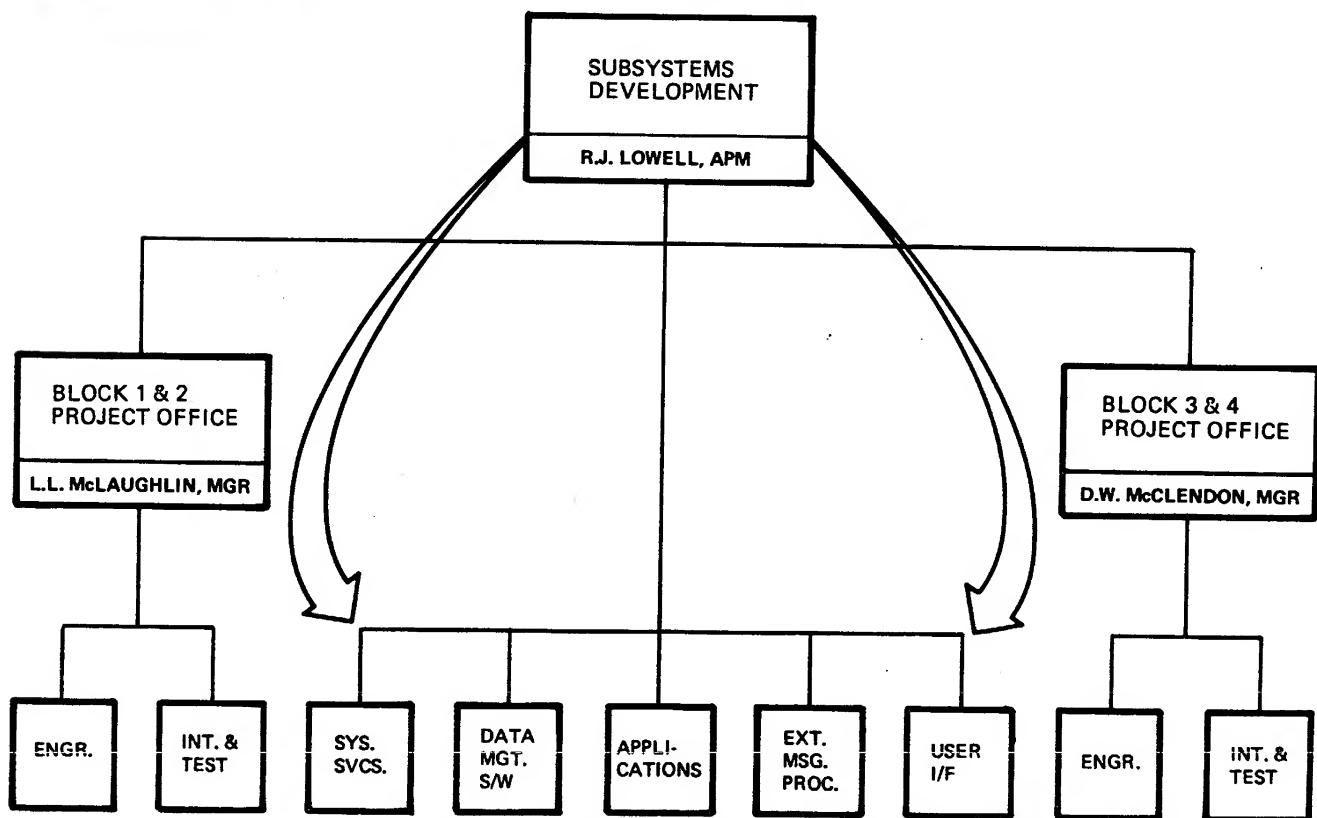


## CONTENTS OF BLOCK 4 (DIA)

- **BLOCKS 1, 2, AND 3 PLUS:**
  - AUTOMATIC RECONFIGURATION
  - OPERATOR CONTROL OF USER PRIORITIES
  - ADDITIONAL CONVERSION



## SUBSYSTEMS DEVELOPMENT ORGANIZATION





## BLOCK 3 INCREMENTS

- **INCREMENT 5 - DATA BASE AND ON-LINE USER SUPPORT**
  - STRUCTURED DATA BASE
  - GEOGRAPHIC AND LINKED SEARCHES
- **INCREMENT 6 - BATCH AND EXTERNAL SUPPORT**
  - BATCH SUPPORT
  - ON-LINE PROGRAMMING
  - EXTERNAL INTERFACES
  - COLLATERAL FILTER
- **INCREMENT 7 - DIA/DIAOLS OPERATIONS CONVERSION**
  - DATA AND PROGRAM CONVERSION
  - RPG UPDATE
  - BATCH PROGRAM CONVERSION



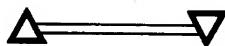
## BLOCK 3 & 4 SCHEDULE

1980 | 1981 | 1982 | 1983 | 1984

ENGINEERING ANALYSIS



PROCESS DESIGN



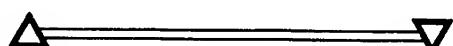
BLOCK 3 SOFTWARE DEVELOPMENT

△ BLOCK 1  
TURNOVER TO TEST

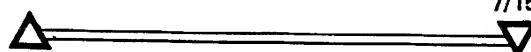
INCREMENT 5



INCREMENT 6



INCREMENT 7



BLOCK 4 SOFTWARE DEVELOPMENT

INCREMENT 8

7/15  
12/31  
△ BLOCK 3  
DELIVERY

10/14  
△ BLOCK 4  
DELIVERY



## **CURRENT BLOCK 3 ENGINEERING ANALYSIS ACTIVITIES**

- **BLOCK 1 COMMON BASE AND BLOCK 3 DESIGN COMPATIBILITY**
  - IDF DMS DESIGN CONCEPTS
  - USER INTERFACE AND APPLICATIONS IDF DESIGN CONCEPTS
  - RPG/BATCH DESIGN ANALYSIS
  - SAFE D OPERATIONAL CONCEPT DEFINITION
- **CONVERSION REQUIREMENTS DEFINITION**
- **EXTERNAL INTERFACES**
- **SYSTEM INTEGRATION AND SUBSYSTEM TEST PLANS AND PROCEDURES**



## BLOCK 3 PROCESS DESIGN ACTIVITIES

- BATCH/RPG/DMS/APPLICATIONS INTERFACE ANALYSIS AND DESIGN DEFINITION
- OPERATIONAL CONCEPT DEFINITION
- INITIATE
  - H/W AND S/W ARCHITECTURE DESIGN
  - BLOCK 1/3 TRANSITION
  - DETAILED INCREMENT DEFINITION
  - CATEGORY B CONVERSION REQUIREMENTS DEFINITION
  - TEST AND CONVERSION TOOLS DEFINITION
- IN-PROCESS REVIEWS
  - JUNE '81 (START INCREMENT 5 INITIAL DESIGN)
  - OCTOBER '81 (START INCREMENT 6 & 7 INITIAL DESIGN)



## KEY AREAS FOR MANAGEMENT EMPHASIS

- DATA BASE MANAGEMENT SYSTEM
  - DMS II
  - ALTERNATIVES
- DIA CONVERSION
  - SAFE D OPERATIONAL CONCEPT
  - CONVERSION REQUIREMENTS (CATEGORY B, C, AND D)
- COMPARTMENTED MODE OF OPERATION
  - BLOCK 3 DESIGN IMPLICATIONS

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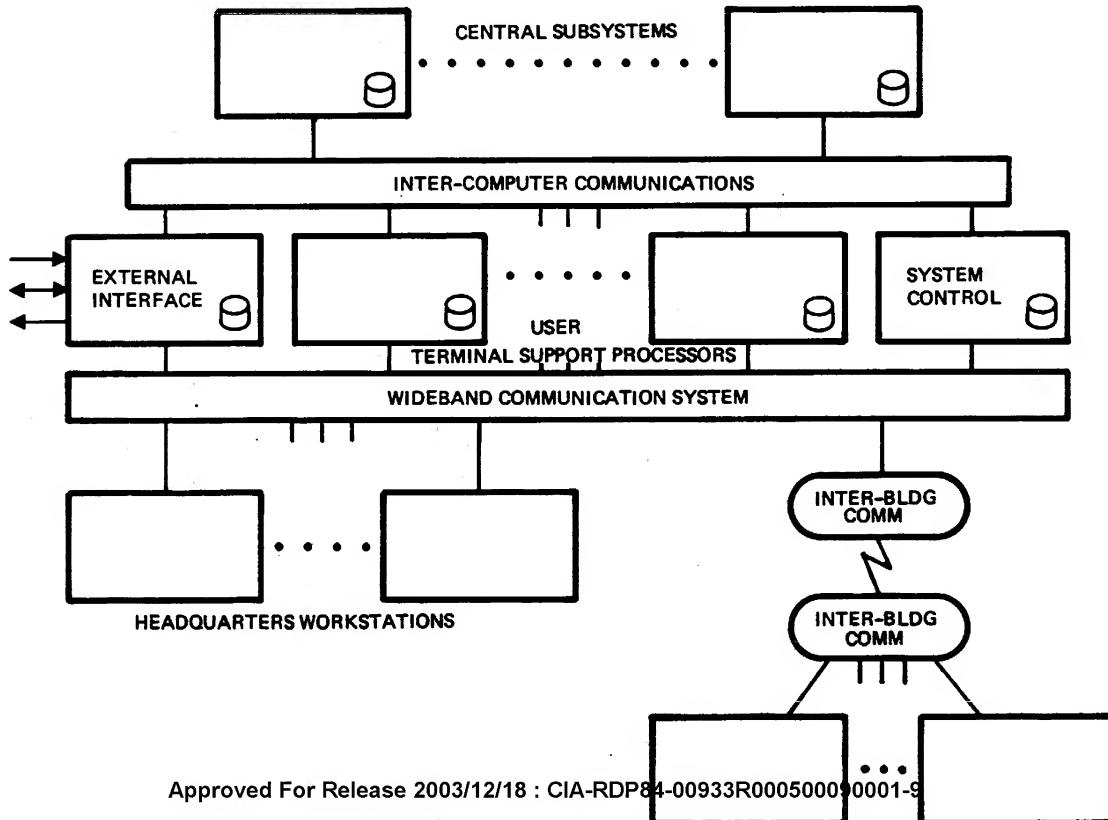
**SAFE ADPE**

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*R.N. SPANBAUER  
22 JANUARY 1981*



## THE SAFE ARCHITECTURE





## CURRENT HARDWARE BASELINE

	DF	C	D	TOTAL
GLOBAL (DUAL MAXI)	1	1	1	2
MIDI	5	10	6	16
ICC ADAPTERS	7	12	8	20



## ADPE SCHEDULE-DF

1980

1981

— J J A S O N D J F M A M J J A S O N —

△  
8/29  
AWARD  
TO  
BURROUGHS

△  
12/15  
DF  
BOD

12/15  
△  
1-GLOBAL

12/15 1/15 2/13 3/16  
△ △ △ △  
1-MIDI 1-MIDI 1-MIDI 1-MIDI

9/10  
△  
1-MIDI



## ADPE SCHEDULE

### SITE C

1981

1982

M J J A S O N D J F M A M J J A S O

5/13  
△  
BOD

9/15  
△  
3 MIDI'S

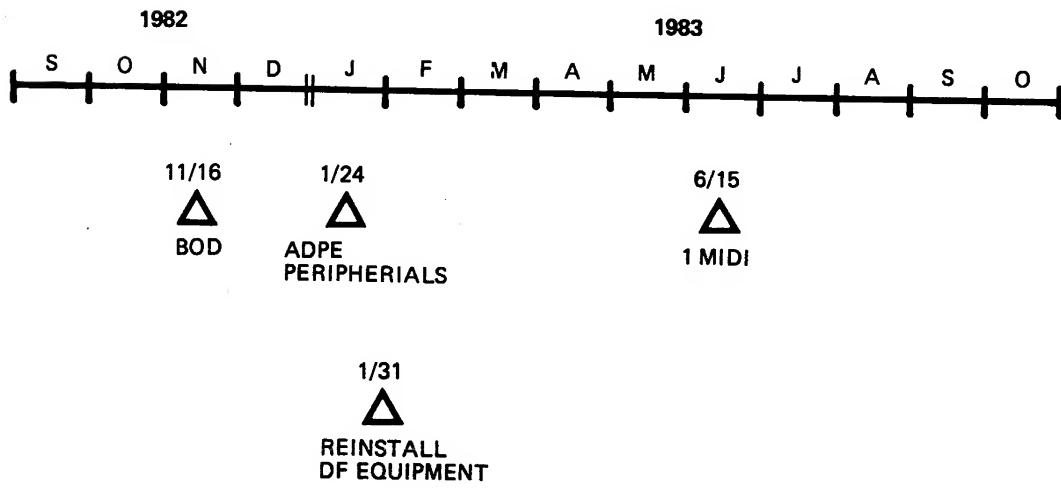
1/15  
△  
1 GLOBAL  
5 MIDI'S

9/15  
△  
2 MIDI'S



## ADPE SCHEDULE

### SITE D



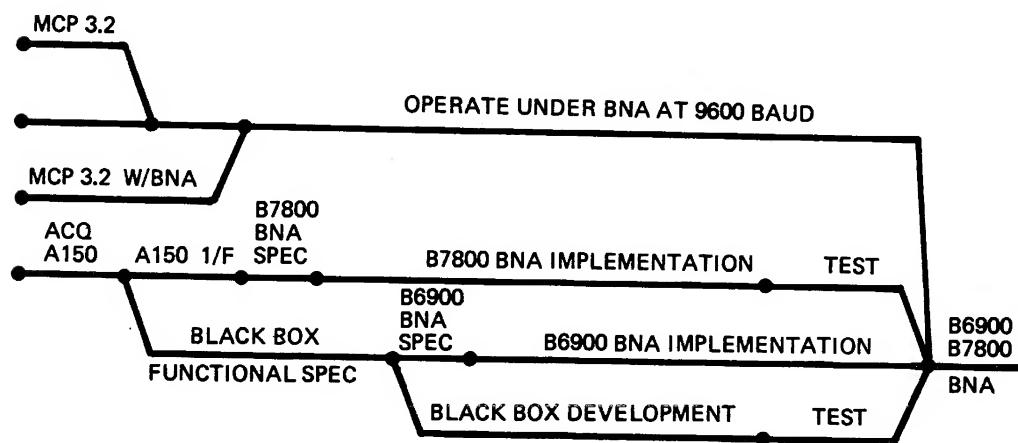


## ICC SCHEDULE

1981

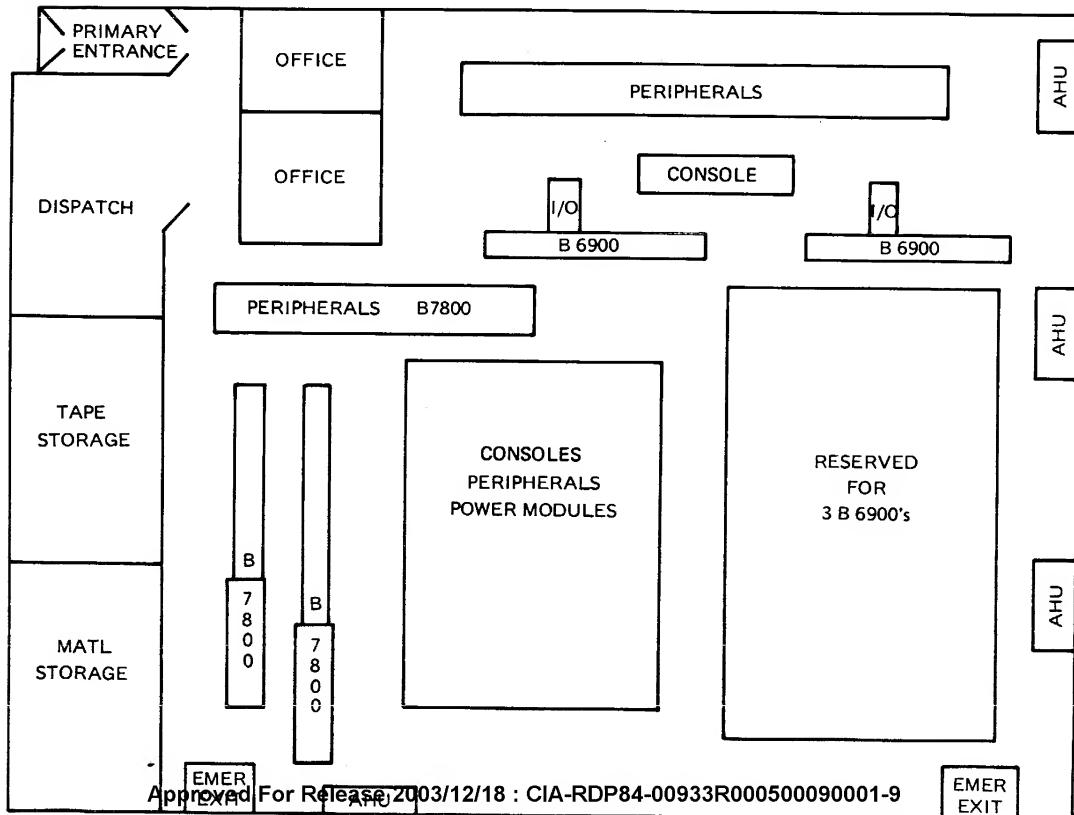
1982

— J F M A M J A S O N D || J —





## DF CONFIGURATION



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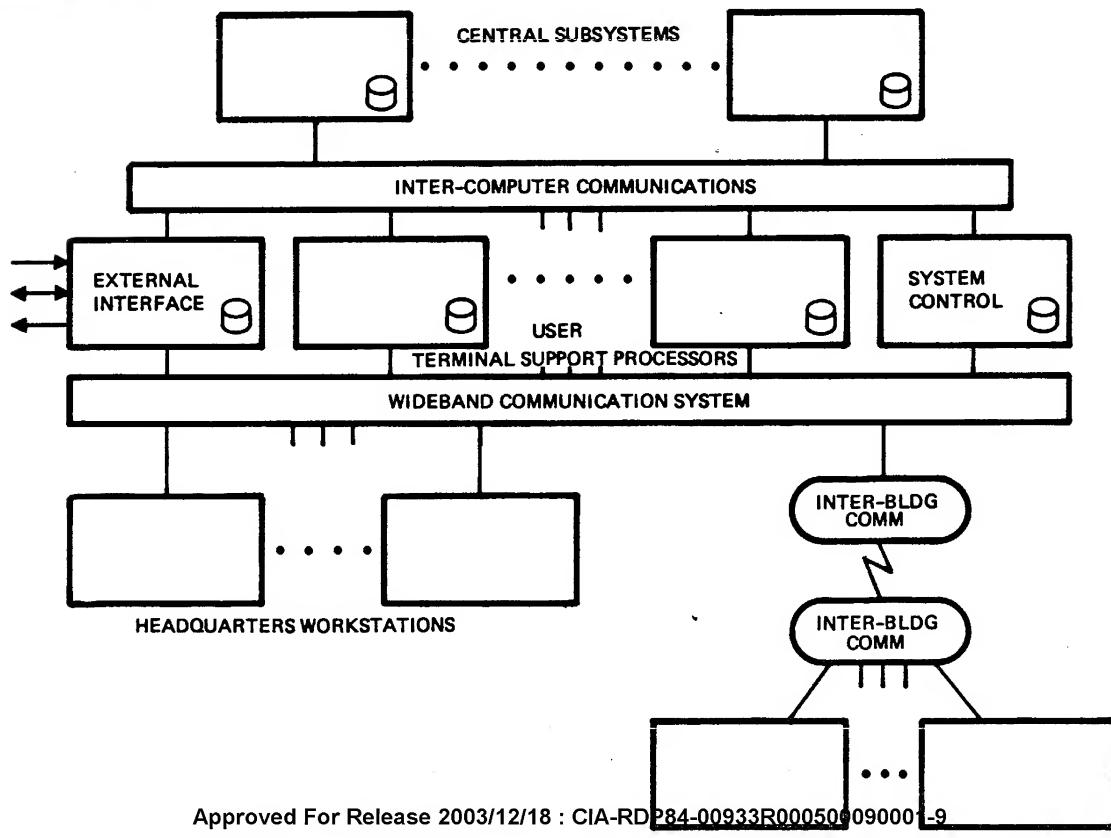
COMMUNICATIONS

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H.M. FRANCE  
22 JANUARY 1981



## THE SAFE ARCHITECTURE





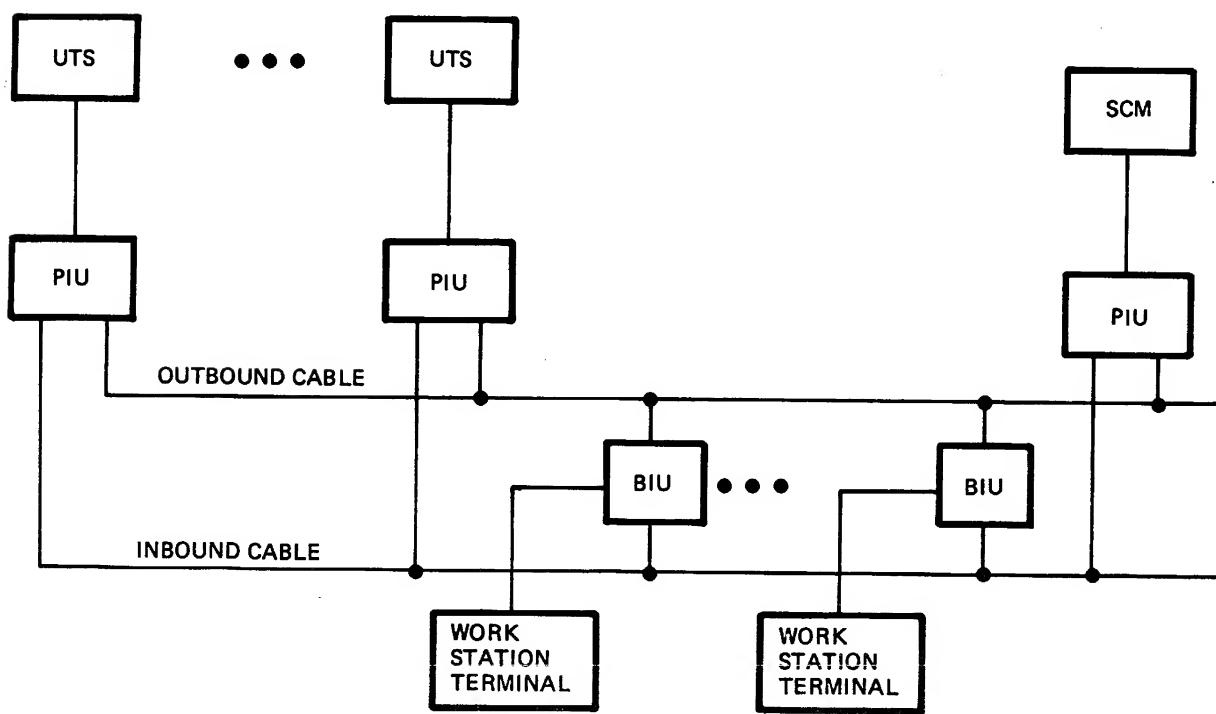
## WIDEBAND COMMUNICATIONS (WBC) SUBSYSTEM

- **THE WBC FOR SAFE REPRESENTS:**

- UNIQUE APPLICATION OF EXISTING TECHNOLOGIES
- HERETOFORE UNAVAILABLE COMMUNICATIONS CAPABILITY
- SUPPORT FOR 2,000 PLUS SAFE USERS
- GROWTH TO 10,000 PLUS USERS



## SYSTEM OVERVIEW



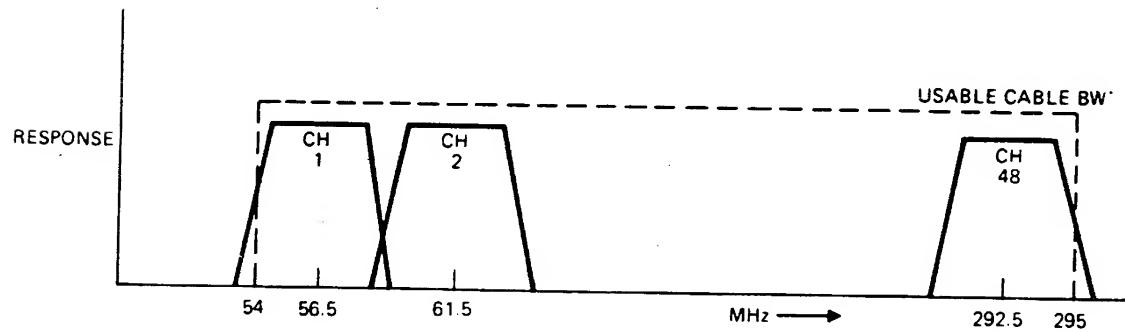


## TECHNIQUE

- FREQUENCY DIVISION MULTIPLEXING (FDM)
- TIME DIVISION MULTIPLEXING (TDM)
- FREQUENCY AGILE MODEMS

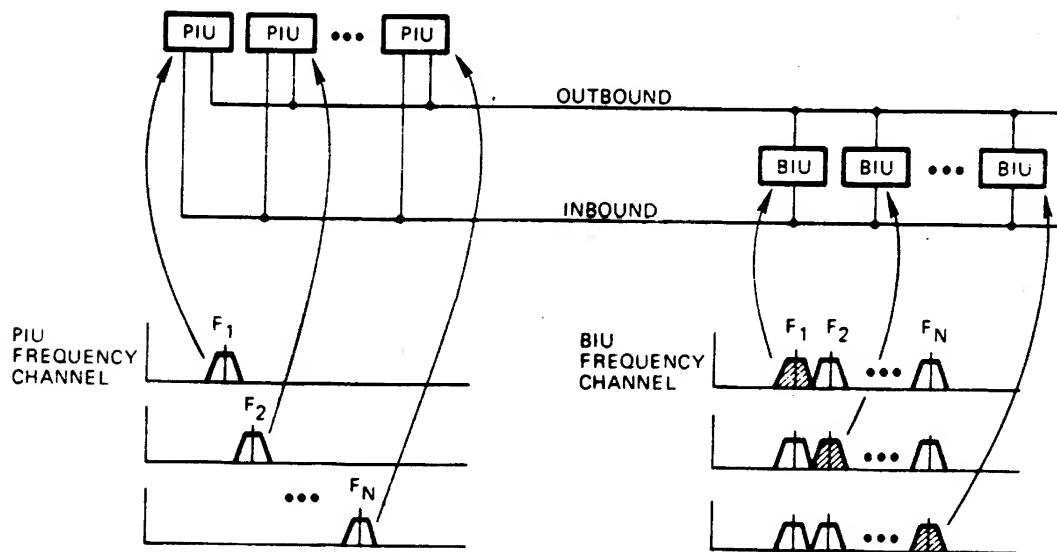


## BUS FREQUENCY PLAN



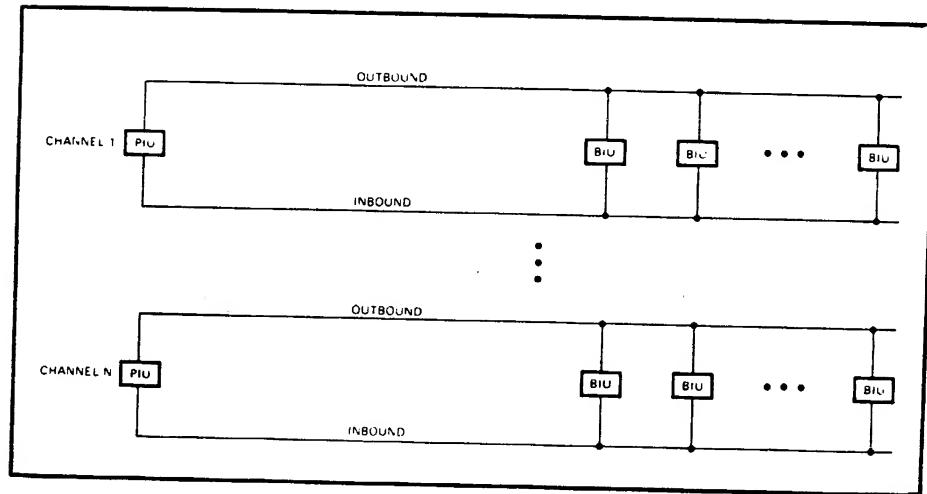


## SINGLE POINT TO MULTIPLE POINT NETWORK



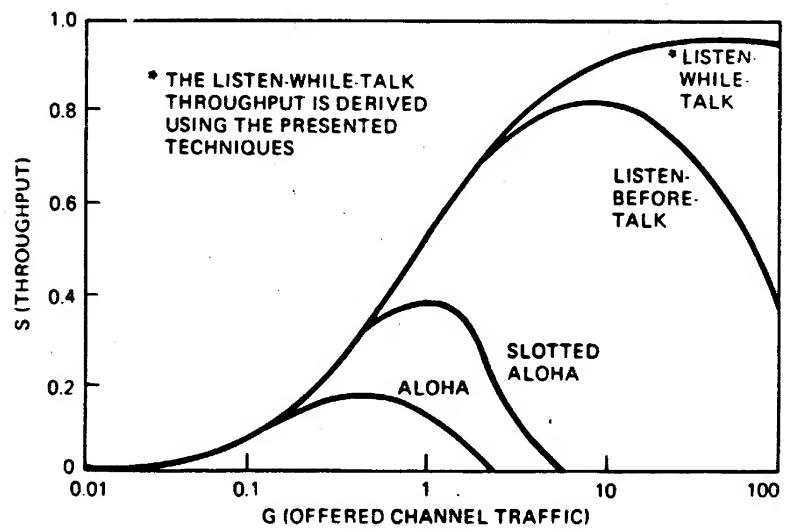


## SINGLE POINT TO MULTIPLE POINT LAYOUT



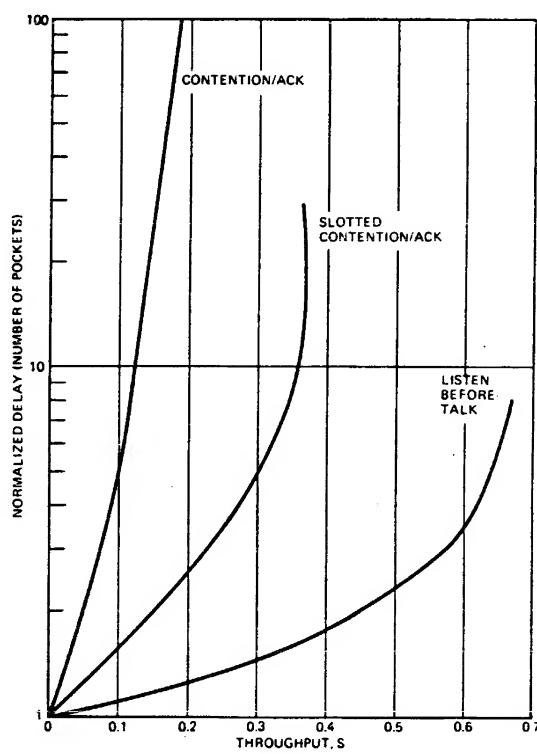


## THROUGHPUT FOR FOUR ACCESS MODES





## NORMALIZED PACKET DELAY VERSUS THROUGHPUT



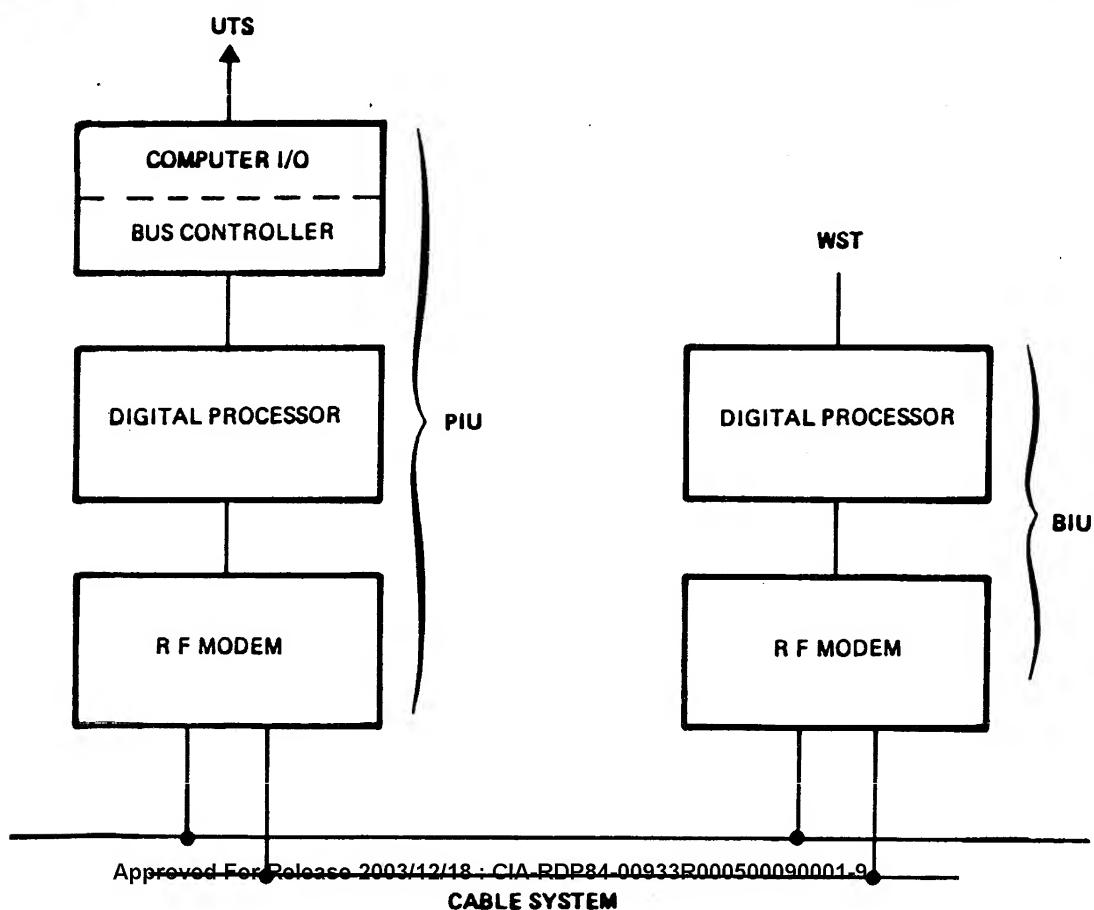


## HARDWARE

- PROCESSOR INTERFACE UNIT (PIU)
- BUS INTERFACE UNIT (BIU)
- CRYPTOGRAPHIC EQUIPMENT

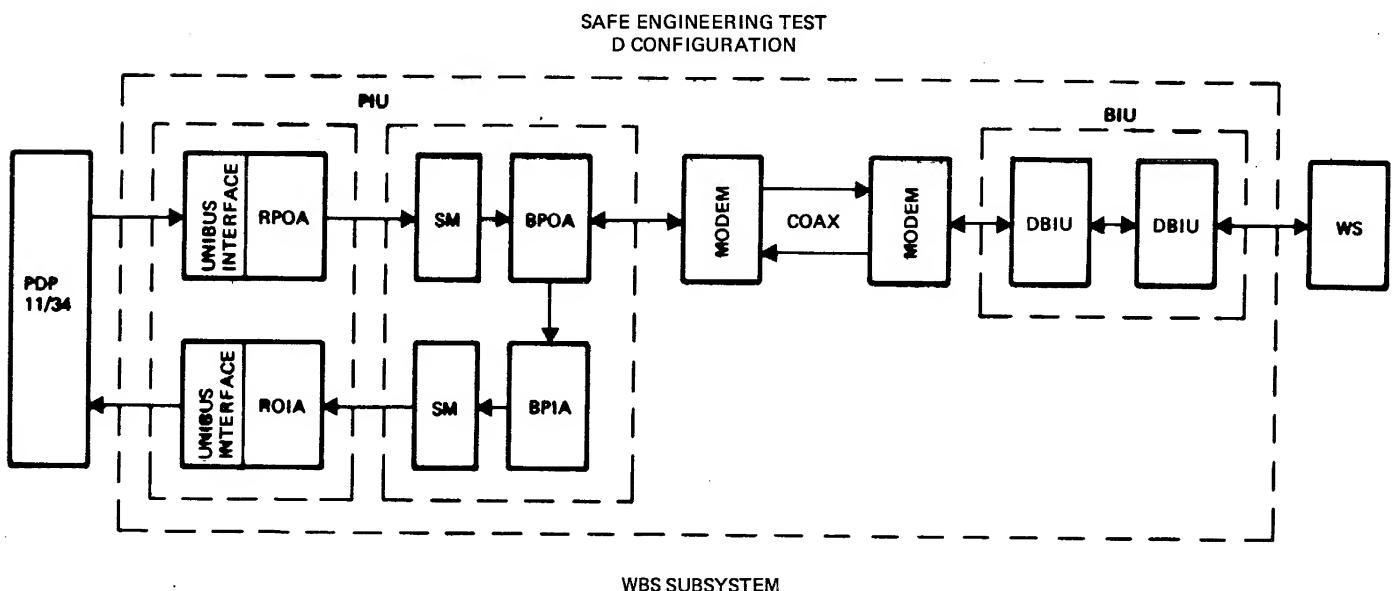


## PIU AND BIU BLOCK DIAGRAM



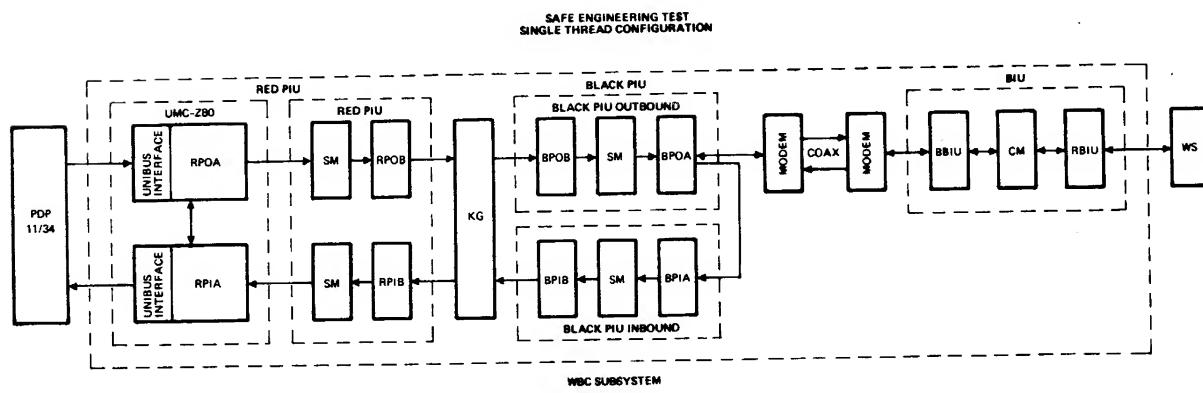


## SAFE ENGINEERING TEST D CONFIGURATION





## SAFE ENGINEERING TEST SINGLE THREAD CONFIGURATION



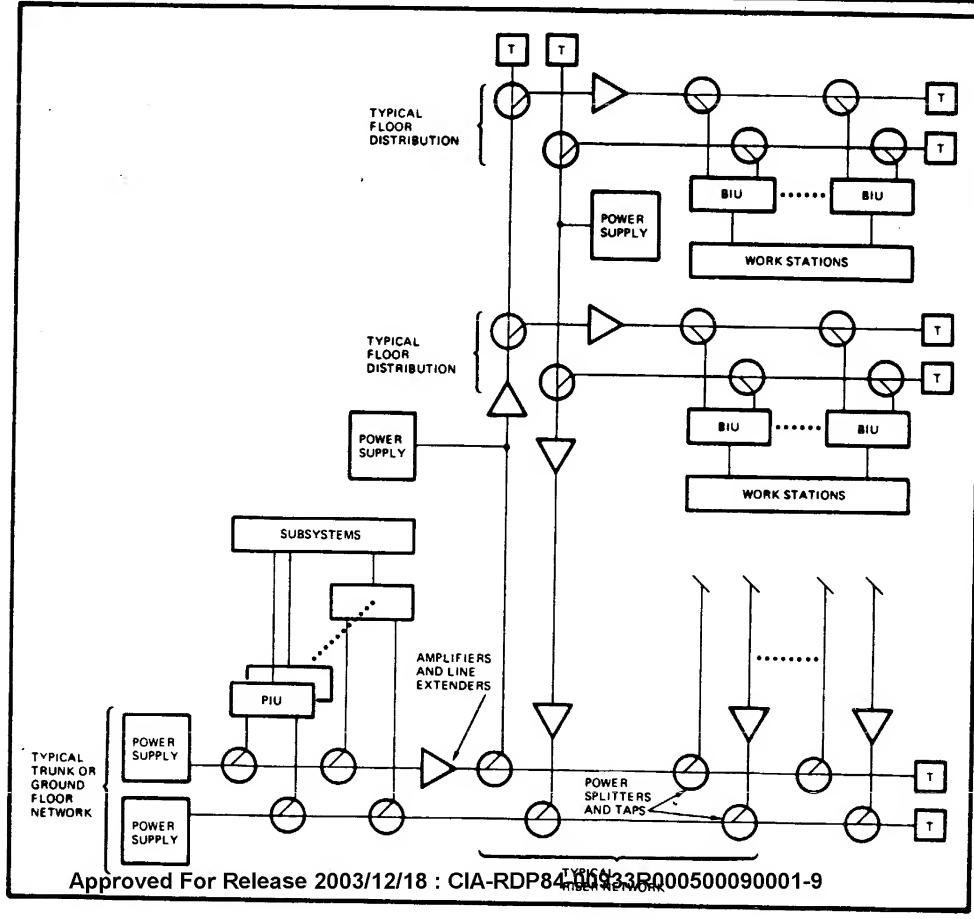


## MEDIA

- COAXIAL CABLE
- AMPLIFIERS
- SPLITTERS/TAPS
- DROPS

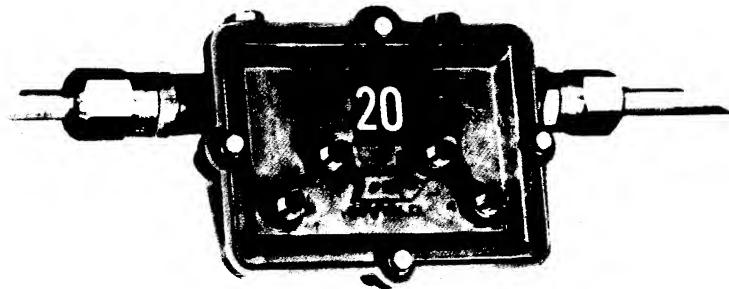
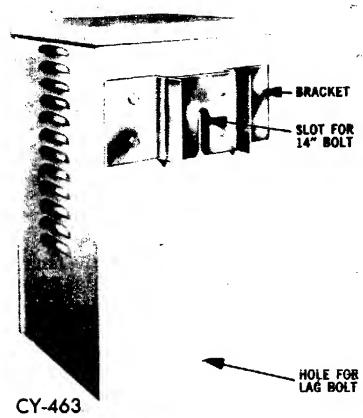


## CABLE NETWORK FUNCTIONAL BLOCK DIAGRAM



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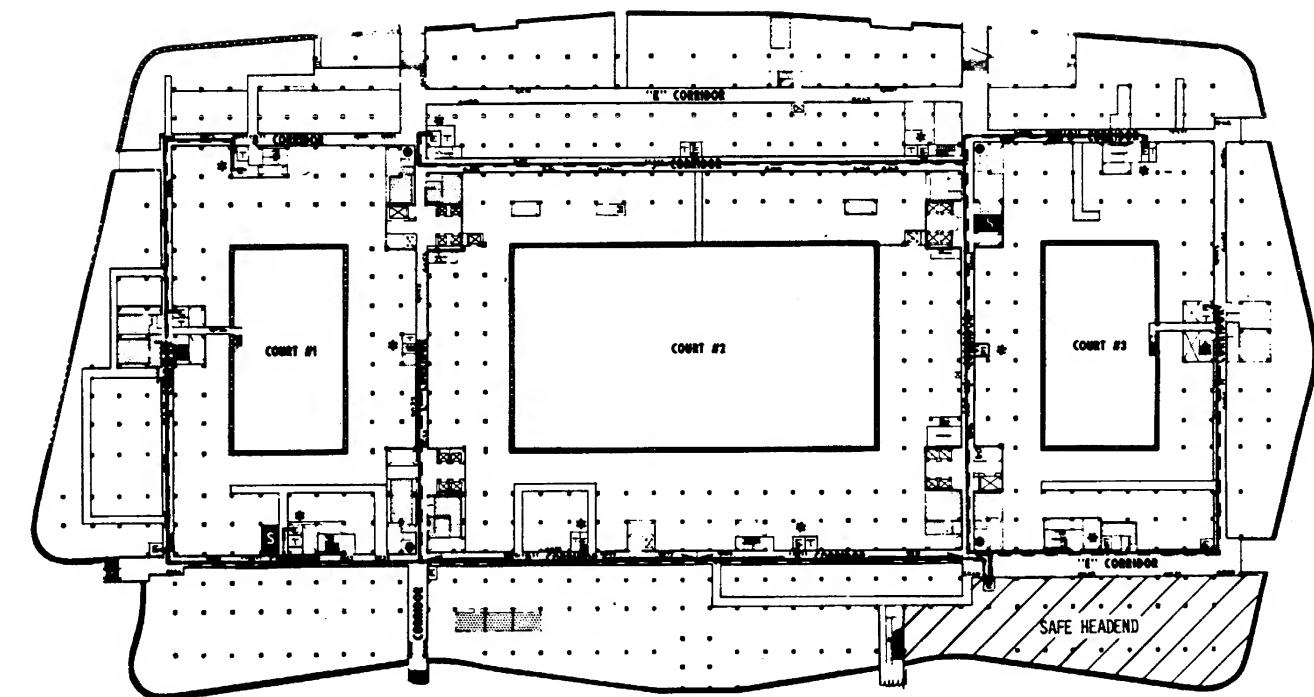
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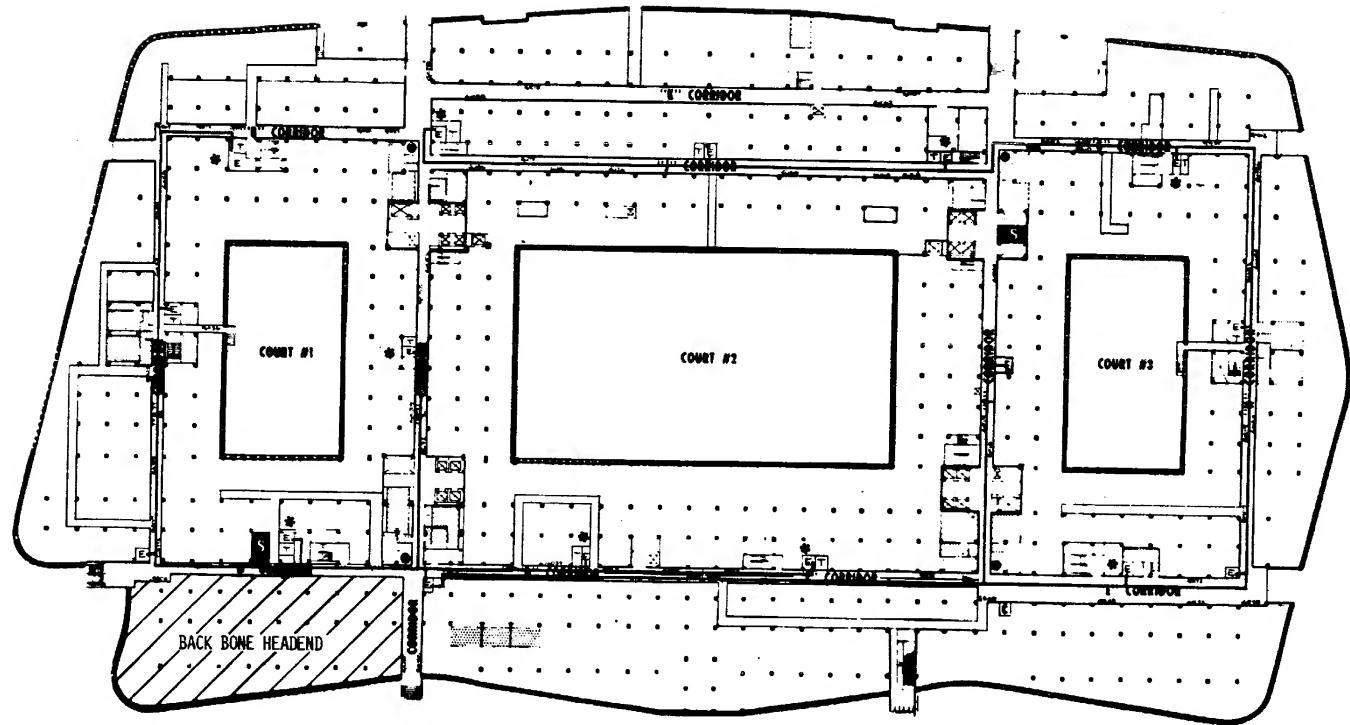
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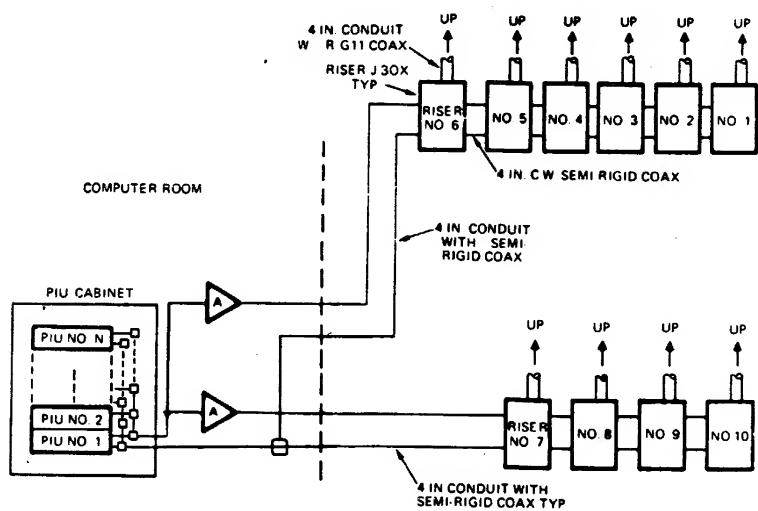


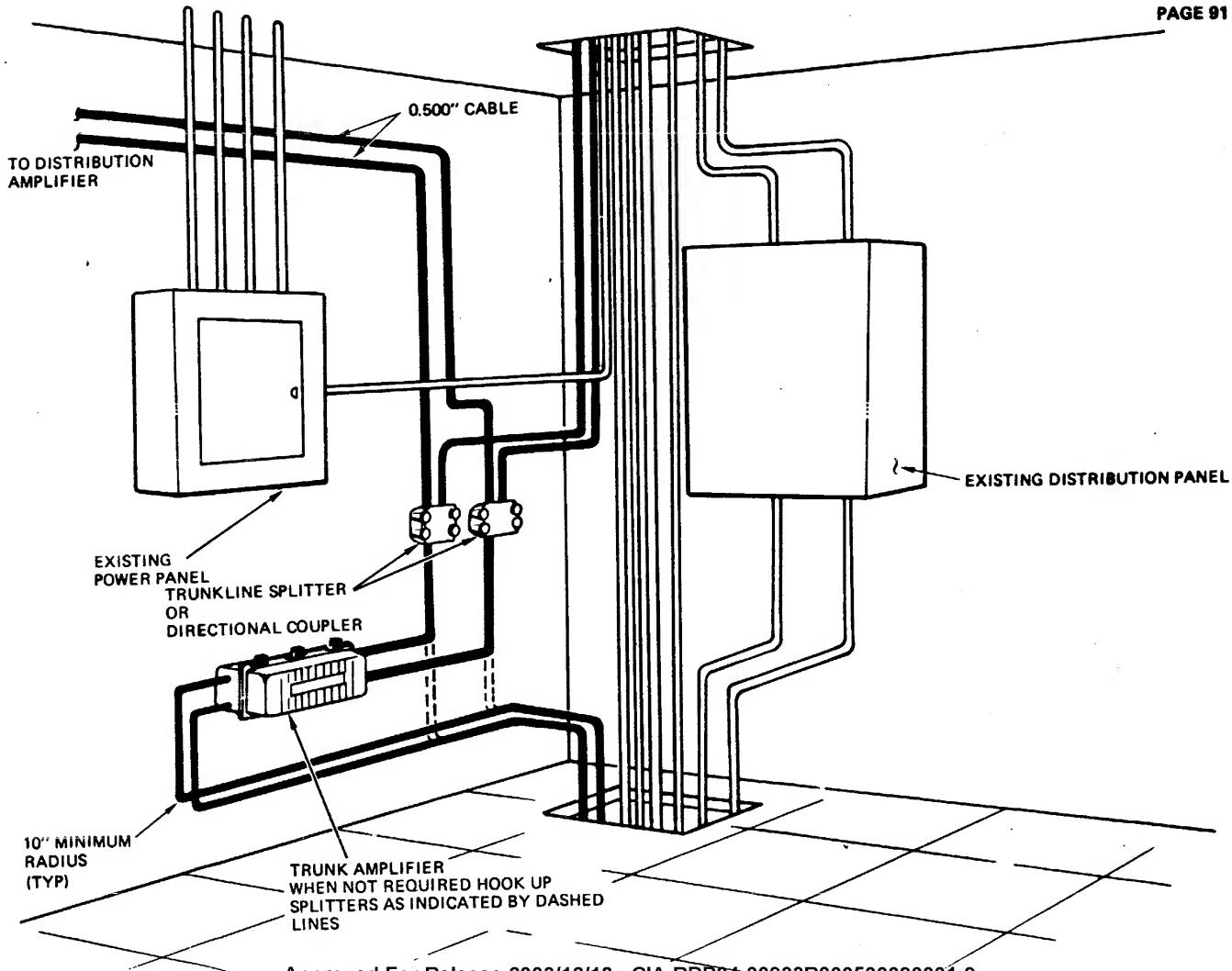
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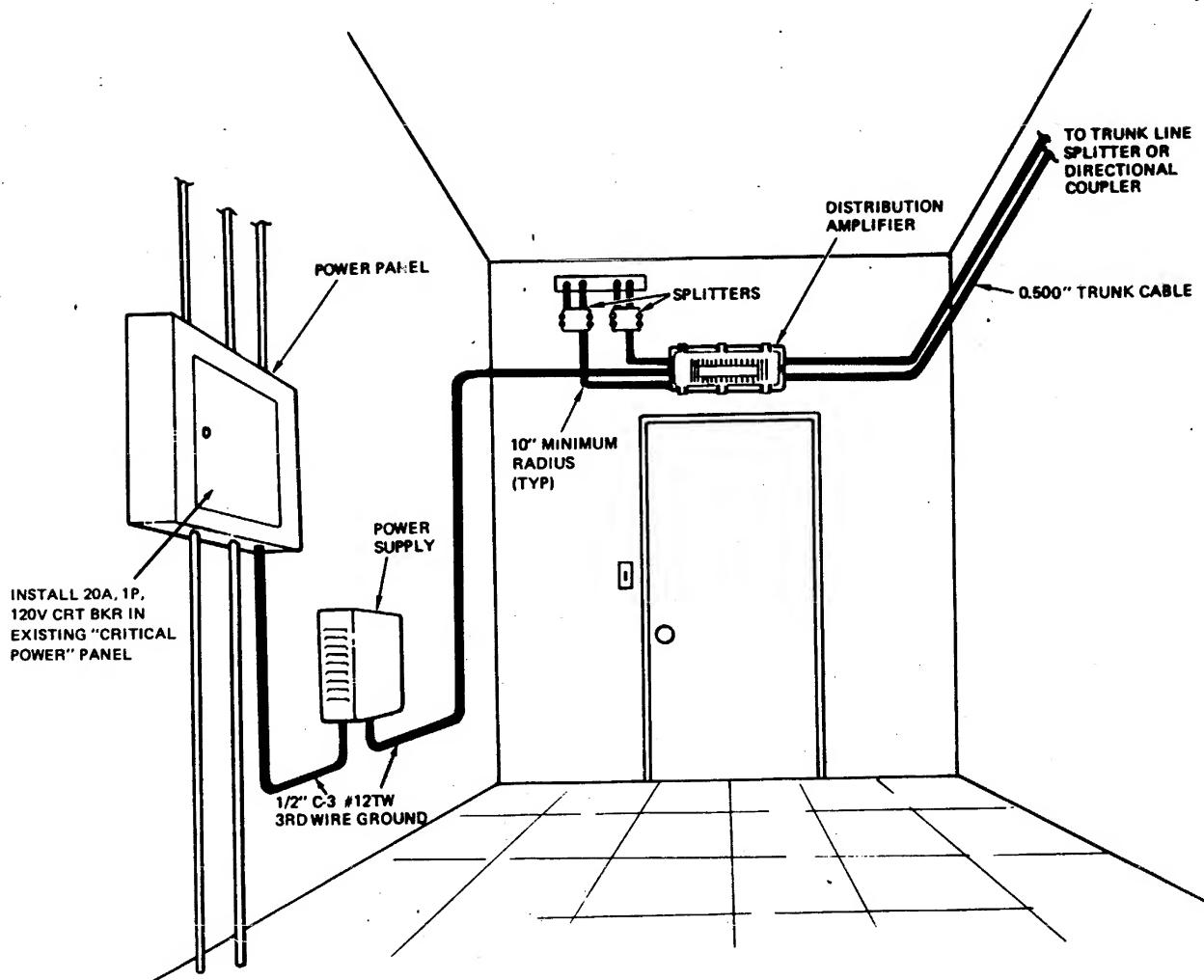


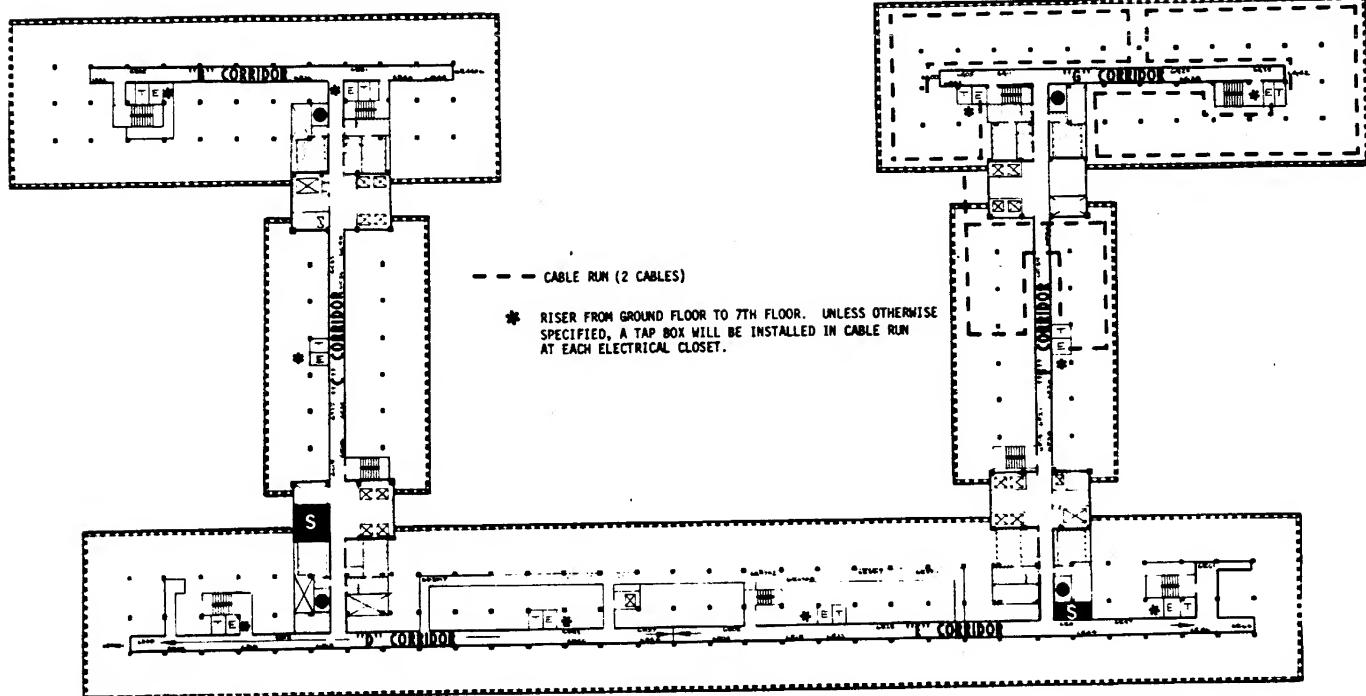


## GROUND FLOOR CABLE NETWORK CONFIGURATION



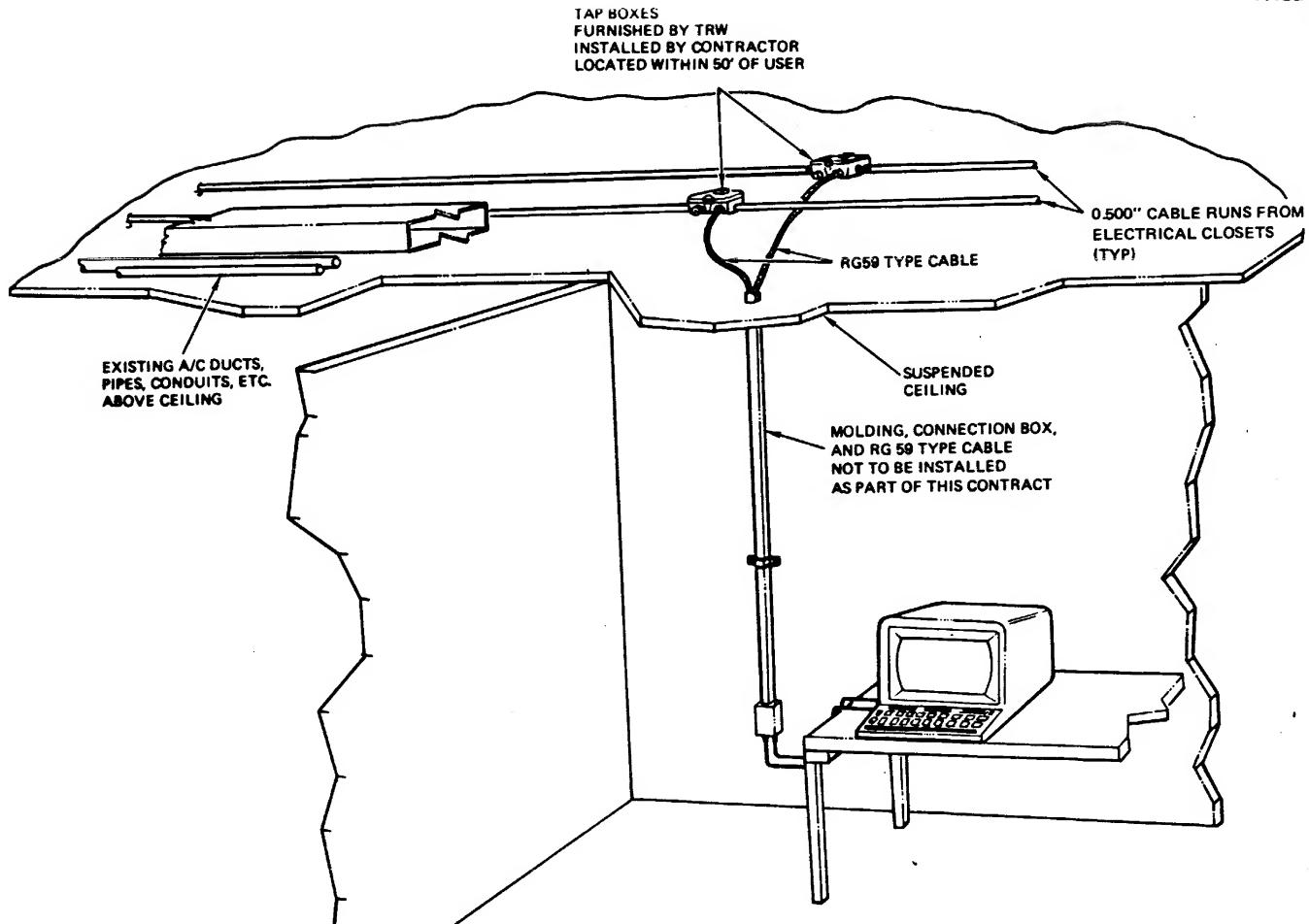






FRONT

SIXTH FLOOR





## SAFE COMM ENGINEERING TEST CONFIGURATION

